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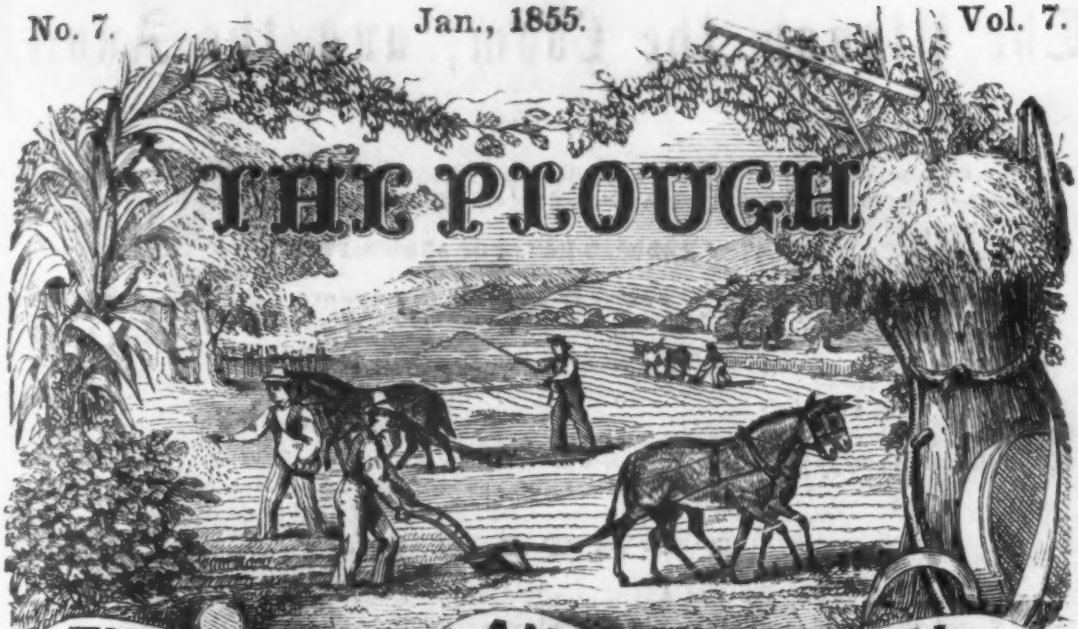
THE PLOUGH



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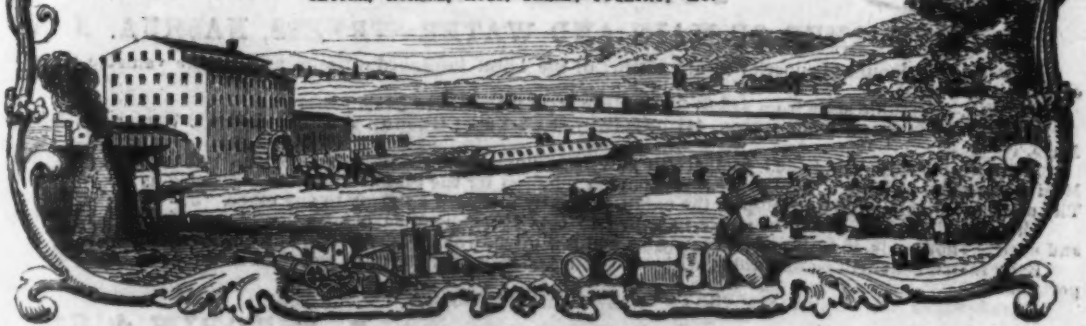

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The Plough, the Loom, and the Anvil.

VOL. VII. JANUARY, 1855. No. 7.

SCIENCE IN AGRICULTURE.

In our November number, we gave a full account of the arguments, on one side and the other, which are derived solely from experiments, on the question, "Whence do plants derive their nitrogen?" And we have repeatedly given it as our opinion that, if the ground is in a proper condition, every plant will find this element without difficulty. We can not doubt this, and would by no means therefore commend the heavy outlays of millions of dollars annually, in this country, to obtain what the atmosphere, and rains, and brooks contain in abundant quantities, and readily supply without cost. But this is by no means the only department of agricultural science on which there is a diversity of opinion. The number of unquestionable facts, touching the cultivation of the soil, is exceedingly limited.

Thus, it is one of our "received" doctrines that the soil must contain what the plant requires, and yet if the nitrogen of the plant is furnished from the air and from water, this is, at least, one exception. Another element is, no doubt, supplied from other sources, to wit: the carbon. From the statements presently cited, as well as from other sources, we may conclusively draw the inference, that the soil itself can not furnish the amount of carbon contained in the growing plant. Hence the statement of this general principle should be modified so far as to say that of the *inorganic elements*, the soil is the only known reservoir.

We ought perhaps to add, in this connection, for the sake of avoiding apparent inconsistencies between these statements, and those made by us elsewhere, that the conditions belonging to a "fertile soil" are, *undoubtedly*, required for the most productive crops. The only question is, Why such conditions are required? For it is also true that, while the most successful cultivation peremptorily requires the presence of all these conditions, it still does not necessarily follow that the soil itself conveys, from its own substance into the plant, a single one of its elements. Such an inference would no more be logical than to infer from the fact that some persons can sleep best on a bed of down, that the down furnishes and communicates substantial elements from its own material, in the production of sleep. Because any given physical arrangements are of great utility, or even absolutely essential in furnishing facilities for certain operations, it does not necessarily follow that those arrangements are themselves immediately efficient in performing these operations. They may be merely the staging, by the aid of which other materials are combined into an organized structure.

But we do not purpose to extend this discussion here, but lay out the ground and partially illustrate the present condition of agricultural science, by the passages already referred to, from a very learned German writer.

"The goodness of the soil," he says, "depends upon its inorganic constituents—so far at least as they are soluble in water, or through continued action of carbonic acid; and the more abundant and various these solutions, the more fruitful is the ground." Arguing from this view, it is not richness of soil or humus that produces the multiplied varieties of alpine plants in Germany, or the absence of it that produces but few. "Soluble mineral constituents" are shown to be the characteristic of our cultivated field; and "an agricultural plant" is defined as one "distinguished from wild individuals of the same species, by peculiar qualities, which constitute its fitness in culture, and which depend upon a modification of chemical action." The amazing yield of Indian corn in Mexico—from two hundred to six hundred fold—is something which, with all our skill, we can not accomplish, and is a fact in favor of the argument, "that in no case do the organic substances contained in the ground perform any direct part of the nutrition of plants." The annual destruction of organic matter all over the earth is estimated at 145 billions of pounds, equal to 2¼ billions of cubic feet; and if all vegetation depends on organic matter for nutrition to satisfy this consumption, "there must have been, five thousand years back, ten feet deep of pure organic substance on its surface." Another illustration is furnished by taking the number of cattle and other animals in France in a given year, (1844,) and observing the amount of food they consume. The process of nutrition would require 76,789,000,000 pounds of organic matter—six times more than the whole number contribute of organic matter toward the reproduction; and in 100 years "the whole organic material of the country would be consumed!"

Again, look at a farm. How much more is carried off from it than it gives back again; generally the amount of its yield is three times greater than that of the organic matter it receives: while of the manure applied, the greater part is not taken up, but imperceptibly decomposed. Carbon is the most important of the constituents of plants. An acre of sugar plantation produces 7500 pounds of cane, of which 1200 pounds are carbon; and yet sugar plantations are rarely manured, and then only with the ashes of the burnt canes. With bananas, the result is still more striking; the yield is 98,000 pounds of fruit in a year from a single acre; and of this 17,000 pounds, more than a fifth, is carbon; and the same acre will give the same return, year after year, for twenty or thirty years; and the ground at the end of that time will be richer than at the commencement, from nothing more than the decay of the leaves of the plant. Here in Europe, too, the difference in weight and in carbon between the seed and the produce has often been noted: in wheat, 89 per cent; in red clover 158 per cent; in peas, 361 per cent. These facts afford evidence of a supply of carbon derived from other sources than those commonly supposed to exist; and while we know that seeds will germinate and become vigorous plants in pure quartzose sand, or in cotton wool, or on a board, we seem to have proof that the chief source of supply is the atmosphere. This is an interesting point, which further research will verify. Schleiken shows the process to be eminently simple. He says in his work: According to Link, Schwartz, and others, an acre of water meadow contains 4400 pounds of hay; which, when dry, contains 4⅝ per cent of carbon. The hay then yields 1000 pounds of carbon, to which 1000 pounds may be added in the portion of the year in which the grass is not cut, and the roots. To produce these 3000 pounds of carbon, 10,980 pounds of carbonic acid are requisite, which may be raised to 12,000 pounds to compensate for the nightly expiration. Now Schubler has shown

that an acre of so wretched a grass as *Poa annua*, exhaled in 120 days of active vegetation, 6,000,000 pounds of water. To supply the exigencies of the plants, therefore, it is only necessary for the meadow to imbibe 3½ grains of carbonic acid with every pound of water.

Mr. Lawes has found also, in a plant of any one of our ordinary crops, more than 200 grains of water must pass through it for a single grain of solid substance to accumulate within it. He states that an evaporation from an acre of wheat during the period of its growth, to be 114,860 gallons, or 73,510,000 gallons per square mile. With clover it is rather more; with peas and barley less. When we apply these calculations to a county or a kingdom, we are lost in the magnitude of the processes by which nature works, but we see the more clearly that on such a scale the quantity of material supplied by the air, though minute to the individual, becomes vast in the aggregate. We, see moreover, the necessity of understanding the relations between the evaporation and rate of growth, and the laws and effects of absorption in soils. A thousand pounds of dry calcareous sand will gain two pounds in weight in twelve hours, when the air is moist, while pure agricultural clay will gain thirty-six pounds.

The source of nitrogen comes next to be considered; and this also is seen to be independent of manures. Hereupon it is observed, that "our domestic plants do not require a greater supply than in a state of nature. A water meadow which has never received any dung, yields from forty to fifty pounds of nitrogen, while the best ploughed land yields only about thirty-one pounds. The plants for which most dung is used, as potatoes and turnips, are in fact proportionally the poorest in nitrogen." That there is a supply independent of the soil is further seen in the millions of hides furnished every year by the cattle of the Pampas, without any diminution of produce; and in the great quantity of nitrogenous matters, hay, butter, and cheese, carried off from pasture land, far more than is returned by the animals fed thereon. Experiments with various kinds of plants, on various soils, have satisfactorily demonstrated that increase of nitrogen in the land and in the crop, does take place quite irrespective of supplies of manure.

With respect to ammonia, "it appears that one thirteenth of a grain in every pound of water is sufficient for the exigencies of vegetation, and there is perhaps no spring water in the universe which contains so little." Then as to sulphur and phosphorus, which are also among the constituents of plants, the quantity needed in proportion to the time of vegetation is so small, that one 540,000th of a grain of sulphuretted hydrogen per cubic foot, diffused through the atmosphere to a height of 3000 feet is all that is required. The consideration that cereals would soon disappear from the north of Europe, if not cultivated, and perhaps from nearly the whole of this quarter of the globe, adds weight to the arguments in favor of enlightened attention to the inorganic constituents of plants. The point is to bring the soil into harmony with the conditions by which growth may best be promoted. Much depends on the nature of the soil; the darkest colored lands are generally the highest in temperature, hence the advantage of vegetable mould, while deep light sands and clay, which turn almost to stone in dry weather, weary and vex the cultivator by their unprofitableness. It is to be remembered, however, that soils which have the highest temperatures of their own, may not be those most susceptible of receiving heat—that is, from the sun, because some lands are warmed by the springs that irrigate them. Here we have an explanation of the phenomena of certain soils, which are warm in winter

and cool in summer. The application of humus evolves heat by the process of combustion, and sand, lime, clay, and humus are the combinations needed, the clay being in a proportion of forty to fifty per cent; if less than ten per cent, the land will be too light and poor.

ARCHITECTURE.

In a former number, in illustrating the social influence of architecture, we referred to the change of the *hearthstone* for the close stove, or the *register*, and the bright and cheerful fire for the distant and invisible furnace. How great is that change! It removes one of the elements which had an important influence in binding families together, in past generations, and it brings in its stead—nothing. We can ill afford to lose so important a check upon the wayward tendencies of youth. It makes home far less attractive.

This is one point in which we have lost much. There are others in which we neglect our opportunity to gain much. We quote from Ruskin: "Have not these words, pinnacle, turret, belfry, spire, tower, a pleasant sound in all your ears? I do not speak of your scenery, I do not ask you how much you feel that it owes to the gray battlements that frown through the woods of Craig Millar, to the pointed turrets that flank the front of Holyrood, or to the massy keeps of your Crichtoun and Bosthwick, and other border towers. But look merely through your poetry and your romances; take away out of your ballads the word *tower* wherever it occurs, and the ideas connected with it, and what will become of the ballad? See how Sir Walter Scott can not even get through a description of Highland scenery without help from the idea:

> 'Each purple peak, each flinty spire,
> Was bathed in floods of living fire.'

Take away from Scott's romances the word or idea *turret*, and see how much you would lose. Suppose, for instance, when young Osbaldistone is leaving Osbaldistone Hall, instead of saying 'The old clock struck two from a turret adjoining my bed-chamber,' he had said, 'The old clock struck two from the landing at the top of the stairs,' what would become of the passage? and can you really suppose that what has so much power over you in words has no power over you in reality? Do you think there is any group of words which would thus interest you, when the things expressed by them are uninteresting? For instance, you know that for an immense time back, all your public buildings have been built with a row of pillars supporting a triangular thing called a pediment. You see this form every day in your banks, and club-houses, and churches, and chapels; you are told it is the perfection of architectural beauty, and yet suppose Sir Walter Scott, instead of writing 'Each purple peak, each flinty spire,' had written 'Each purple peak, each flinty pediment,' would you have thought the poem improved? And if not, why would it be spoiled? Simply because the idea is no longer of any value to you; the thing spoken of is a nonentity.

These pediments, or stylobates and architraves, never excited a single pleasurable feeling in you—never will to the end of time. They are evermore dead, lifeless, and useless, in art as in poetry, and though you built as

many of them as there are slates on your house-roofs, you will never care for them."

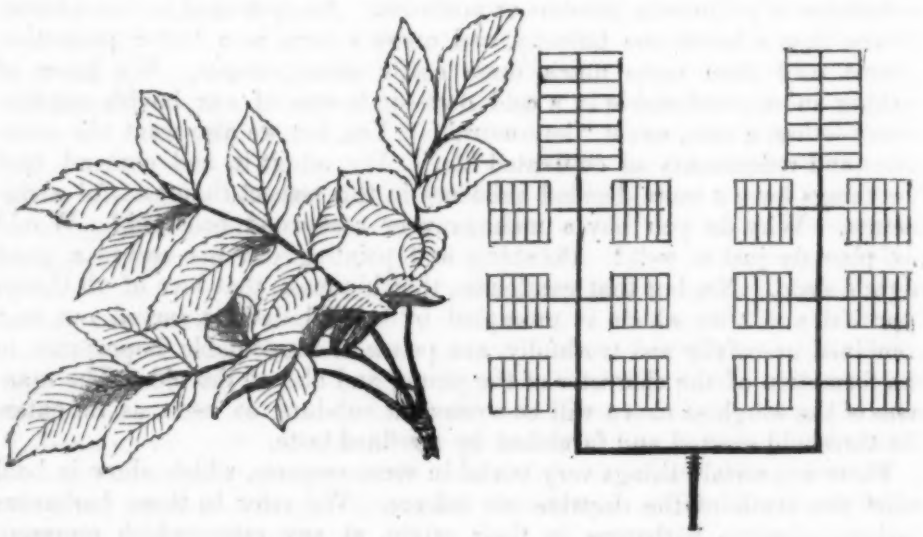
It may be said that all this is poetry. Granted, if you please, only acknowledge that it is reality. If it is poetry, it is something we can ill afford to lose. Our developments of cold, business, acquisitive, delving, debasing tendencies are monstrous. If we let go what little there is of poetical, imaginative, devotional, in us, we shall be monsters indeed.

What ends are to be gained by architectural structures? Why build any houses or churches? The first answer is, for utility and comfort; we need protection from the elements, whether by night or by day. But these objects will be equally well secured by much cheaper structures than are built even in our economical times. This end is not obtained by means of architraves or pediments, pilasters or porticoes. An open shed is even a better defense than a handsome balcony, and many a barn is a better protection against cold than some much more costly arrangements. We know of nothing more comfortable in a cold day—it is one of our boyish reminiscences—than a nice, sweet "hay-mow." "Yes, but we also want the courtesies and refinements of cultivated life." We admit it, and contend that few things have a more decided influence in this respect than tasteful architecture. Why do you buy a mahogany or rose-wood bedstead? Would not pine do just as well? Polishing and painting can not secure a good night's sleep. No, but that gentleness, that kindness, that love of all things beautiful and true, which is prompted by tasteful designs, carved out and combined gracefully and truthfully, are points of incalculable importance in the formation of the character of the young and also of the old. The manners of the roughest clown will be somewhat subdued as soon as he enters the threshold erected and furnished by a refined taste.

There are certain things very trivial in some respects, which show in bold relief the truth of the doctrine we inforce. We refer to those barbarous designs—designs barbarous in their origin, at any rate—which represent some little image of gold or bronze, which is so often seen holding up the bowl of a large lamp, or the branches of a candelabrum or of a gas-burner. What child has not remarked upon the fatigue which such a little baby-boy must inevitably suffer? How different the effect, if this same sculptured little boy were only climbing up after a branch of grapes, or some other delicious fruit? We referred, some months since, to a very elegant church in this city, on the Fifth avenue, in which the entire weight of the ceiling rests on human heads. Was any thing ever more absurd? What if the idea is copied from an old master of the fifteenth century? It proves that, great as he was, he could blunder;—that the feat has not yet been witnessed, of an architect who has risen by his own genius, perfect in *all* his proportions, out of the depths of the dark ages. That he has exhibited so few such weaknesses, is one of the greatest of wonders. And modern times show too often how much easier it is to copy errors than to copy truths. We remember another similar remnant of those same dark ages. In the beautiful chapel of the New-York University, you may see, high up on the walls, some chubby little fellows, secured in their places by having their limbs below the knees, (the knees being bent at right angles,) set into the solid wall. As we have listened to some eloquent lecturer in the desk, and our eyes have strayed upward to those chiseled forms, we have felt sincere pity for them, and have wondered why they were doomed to so painful a posture. Besides, if the strength of their knees should fail them, they would swing as on a hinge, and dash their breasts and faces against the wall below, to the ruin not only of

this over-tasked joint, but of their whole persons. Scholars should be more humane.

We are now prepared for a further reply to the question, "What ends are to be gained by architectural structures?" and we say, secondly, to open the way for the graces and amenities of refined society. Whoever admits this, will hold no controversy with us. If any one should be disposed to deny this, we are at a loss to know on what ground he would favor the customs universally prevalent, to a greater or less extent, in civilized communities. Such a man would be contented with a country where the groves and woods were formed in right lines and rectangles, after the fashion of a diagram given in a former number, and which we here repeat for his especial benefit.



And can any one tell us why *living* matter should always—ALWAYS, exhibit some form of the pointed or arched style, any more than dead forms? Yes; convenience. It would be inconvenient, sometimes, to carry out thoroughly this feature, so universal in God's architecture; and this is the only exception that is admissible. It is not proper that utility should be sacrificed to appearances. Wherever the *law of necessity* does not command a different course, let not the law of good taste be violated. In the whole universe of nature there can not be found a specimen of rectangular architecture. The sun, and moon, and stars, are bounded by arched walls. The constellations are grouped in various forms, so that when variously connected, at pleasure, they will present an indefinite variety of figures; and yet, it would be difficult to find any four prominent stars that, when grouped, would make a perfect rectangular figure. We do not allude to this as a fact of very grave authority on the subject before us, but only to show that this style is peculiarly a device of our own invention, and therefore very likely to be inferior, in some essential particular, to the devices of Him who is of infinite wisdom and of perfect truth.

Who would not as soon have devised square plates, and square and cubic forms for a tea service, as square windows? But we need not dwell further on this point. There are greater evils to contend against. Our architecture is scarcely more than a hap-hazard mixture of many crudities and meannesses. We shall endeavor hereafter to bring some of them to the light, that they

may be destroyed. But we would endeavor to have some correct principle to stand upon, ere we undertake any important step in the progress of the science, that, if need be, we may safely retrace our steps and secure a right direction.

FARMING ON TAR RIVER.

Mr. Editor: Facts are sometimes stubborn things, and some men are stubborn farmers, and cultivate stubborn soils, and complain of their Maker, because he does not send genial showers and favorable seasons, and make them good crops.

Who is to blame, the soil or the farmers? No one but those stubborn and self-conceited farmers, who will not read and learn, because, forsooth, *no one can teach them any thing about their avocation!*

Now, I have contended for years, that any planter tolerably well situated for the purpose, on the ordinary up-lands of the oldest settled portions of the South, can make more *manure* and *manure more land* in a year, than *he can clear* and take into cultivation from the forest, and the manured land will make more corn and cotton, one year with another, than the cleared land. There is no doubt about this, and I can produce many witnesses to prove it.

But let one suffice, in this instance, and speak for himself from *Tar River*.

I quote an extract from Mr. John S. Dancy's letter published in the *Farmers' Journal*, at Raleigh, for July.

He says, "I give you an account of our preparations for the crop of '54. In the first place, our laboring force on Panola consists of 34 horses, of various sizes, ages and qualifications; 20 head of mules, and 3 yoke of oxen. During the year 1853, we had two wagons constantly employed in hauling up materials for manure making, besides taking advantage of every day, (when the condition of the growing crop would justify it,) to make compost with our entire force. The interval between laying by the crop, and the beginning of the fodder-pulling and cotton-picking season, (usually from two to three weeks,) was busily devoted to the making of compost and filling up our cattle and hog lots.

After housing our crops of corn, cotton, and peas, which we last fall completed by the 10th December, we again set to work, composting cotton-seed, and ditch bank, stable manure and low-ground soil, and hauling again into the cattle and hog lots. This was kept up (with an occasional hindrance in packing cotton) by nearly all hands and teams, till we commenced ploughing, about the middle of January, with six double teams, using the Maryland or Patuxent plough, procured from Sinclair & Co., Baltimore.

After the ploughing season began, the remainder of our hands and teams continued to make manure in the different ways I have mentioned, till the 28th February, when we commenced the troublesome and laborious job of hauling out what we had collected during the twelve months past. We finished the work of hauling out on the 25th April, being near two months engaged at it, and according to our plan of manuring, one load for every twenty feet square, or 110 loads to the acre, we hauled out compost enough to put on 350 acres of land, or over 35,000 loads, (one-horse cart-loads, five bushels to the load.)

Beside this, we applied twelve tons of Peruvian guano to cotton, corn,

and oats. Some of the compost previously mentioned, had two hundred pounds of guano mixed in each acre-heap, so that, altogether, we have manured over 400 acres of land for the crop of 1854, at the rate of 110 loads to the acre.

Our crop consists of 220 acres of cotton, all manured; 225 in corn, 150 of it manured; 30 in oats, and 8 in sweet potatoes, manured. The cotton crop to date looks promising, (the weather at this time is, however, very unfavorable for the cotton plant, and a few days of it will alter the appearance of things.) The corn crop is backward and indifferent, and presents an irregular appearance, owing to the cold snaps the latter part of April, when much of it had to be ploughed up and replanted.

Having detailed to you clearly, I hope, our *preparations*, I will now tell you our calculations, and when the crops are gathered, I will give you and your readers the results, so that you may see how far I miss the mark. You must bear in mind that this is our *third crop* on Panola, and the process of making poor land fertile is the work of years, long years. The land we have now in cultivation, when we took charge of the farm in January, 1852, would have made, in my opinion, without manure, not exceeding 400 pounds of seed-cotton, or two barrels of corn per acre. Our calculation this year is to make 900 or 1000 pounds to the acre of cotton, and four barrels of corn, if an average season prevails.

I will try and recollect to prepare for your January number, the results of our operations for 1854."

Here are four hundred acres of land manured in one year, and a crop made beside. Now, how long would it require to clear 400 acres of such land as he cultivates, and put it in the condition to make the crop he calculates on?

More than one year, and after it is brought to the highest state of cultivation, the virgin soil would not produce exceeding 500 pounds of seed-cotton, and 20 bushels of corn, per acre. And after a few years of cropping, it would not produce near that amount, without manure. Here, then, is an illustration of the benefits of manuring that can not be disputed; and I could name many men in Edgecomb, who have brought about similar results by manuring.

I have seen a great many manure heaps, in my travels in the new and old world, but I never saw *manure piles* until I saw them in North-Carolina; and what did these piles do? They made old barren pine-fields, turned out as worthless, produce 20 bushels of corn, and 1200 pounds of cotton per acre. When I first saw those fields, I could scarcely believe my senses, and recognize them. I looked at the land and then at the cotton. The land looked as poor as ever, but the cotton looked like our black lime-land cotton, branching from the ground, spreading far and wide, and as full of bolls as persimmon trees, that matured early and opened well.

By the side of this cotton, now and then, I could recognize an old friend, a *sap-weed*, growing like a pine tree, all body and no limbs, and but little fruit, and that little maturing late, and much of it killed by frost. How is this, I asked? I was told the good cotton had manure in the drill, and the sorry cotton had none. Before the discovery of shell-marl there, a few years since, and the commencement of the manuring system, many of the Edgecomb lands were lying idle, and but a little cotton cultivated. Cotton culture was abandoned in a manner, because the lands and climate were not considered adapted to its production; but they have discovered that manure adapts both the land and climate to its culture, and Tar River and Pedee

are beating many of the cotton lands of Georgia and Alabama for making cotton. They have this advantage over us—no boll-worms or caterpillers to destroy their cotton.

A *little manure*, I venture to say, would change the production of many of our soils, and make our old fields here snowy with cotton. *Try it, stubborn farmers!*

T. N. Sorsby.

Forkland, Ala., 1854.

—*From Soil of the South.*

RAILWAY TO THE PACIFIC.

It is certain that such a road will be built—the only questions involving much uncertainty regarding the time and the route. It is in respect to the latter that we make a few suggestions.

With a given and limited amount of business, length of route is an obstacle to an undertaking, of most imposing magnitude. But where the length of the road is only proportioned to the amount of business, length is not an evil but a help. A long road with large business, is better property than a short one with little business. The expenses of conducting a road of fifty miles are much larger per mile, than those of a road of five hundred.

Routes on the seaboard are comparatively expensive. All large streams are to be crossed, and the bridges must be of an expensive kind. Where the track is parallel with the streams of the territory, the cost is essentially diminished.

Way business is one of the important elements which give value to a road.

Applying these principles to the Pacific Railroad, we shall be forced to certain conclusions, in reference to the several proposed routes to the Pacific. Let us look at them for a moment.

The most Southern route possible, necessarily contemplates the crossing of all the rivers in Texas, large and small, and where Spanish territory is entered upon, though the route is indefinite, there are, at the best, no advantages gained by pursuing the courses of rivers, for all run in the wrong direction; and though the streams themselves are small, the physical formations, the valleys, and the highlands, are all adverse. But how is it in the higher latitudes? Starting from St. Louis, the physical formation of the surface is entirely favorable. The Kansas, the Platte, the upper portions of the Arkansas, and some smaller streams, if required, furnish a natural route to the very foot of the Rocky Mountains. On the western slope, the Colorado and other rivers may be used with equal advantage. But look at the second point.

The extreme Southern route passes through a foreign state, not yet possessed of the higher forms of civilization, where the arts do not flourish, and can not so long as the government is what it is, and where, of necessity, the population is very limited and trade nearly nominal. But how is it in more northern latitudes? A westward course from St. Louis towards the State of Missouri, the Kansas territory, and Utah, a territory sufficiently large for four or five extensive States, consisting of excellent soil, well watered, and with a fine climate, and capable, of course, of sustaining an immense population. Besides, the materials for the road may be chiefly obtained in the vicinity of the route, in which respect it has a decided advantage over the extreme

Southern road. Hence, also, a third requisite is secured—a large way business.

In all routes, as stated in a previous article, the idea of profit must be regarded only in a somewhat distant future, but that future is as certain as a mathematical demonstration. To doubt this, would be as absurd as to doubt whether one of our genuine progress-men would refuse a capital farm when offered him for nothing.

But there is another consideration of no small importance. A road "ultra-Southern," must ever remain comparatively unimportant to all the States lying in higher latitudes. San Francisco, the Arkansas, St. Louis, etc., are all in the neighborhood of the 38th parallel of latitude. For the sake of this ultra-Southern connection, goods and passengers must be brought down some six hundred miles, or ten degrees of latitude, and then be transported back again, perhaps an equal distance, without an eastern progress of a single mile. There can be no roads branching towards the north, through New-Mexico, nor Texas, the direction of the streams and the necessary formation of the land utterly forbidding any such structures. The Mississippi is the first point from which any connections could be built uniting this with the more Northern roads.

On the other hand, the line of the main track through Kansas, Missouri, Illinois, etc., would be, and is, in fact, already to some considerable extent, connected by branches with every State in the Union, and without any considerable waste of travel. Georgia, the Carolinas, Virginia, etc., are already connecting themselves with the States of Illinois, Indiana, and Ohio, while way travel and freight will soon pay, if they do not already, all the expenses of the connecting roads.

If this is so, the upper route is the only one that can be successfully carried through. We would not, however, decide too hastily such important questions, but we throw out hints that can not be overlooked by those who may have the management of this immense interest, or who may be called upon to lend their aid in behalf of so great an enterprise.

Having thus expressed more fully the ideas suggested in our October number, we will lay before our readers a few statements, from an address by Thos. H. Benton, in reference to the character of the country crossed by the upper route, going to prove that the country near the latitude of 38° is "remarkably adapted for the construction of railroads, and that it is traversable in all directions." If this is so, we should consider these facts decisive on this question. On this point he says:

"I have some direct and positive testimony on this head, which the importance of the subject, and the value of the testimony itself, requires to be produced. I speak of the last expedition of Colonel Fremont—his winter expedition of 1853–54—and of the success which attended it, and of the value of the information which it afforded. He chose the dead of winter for his exploration, that he might see the worst—see the real difficulties, and determine whether they could be vanquished. He believed in the practicability of the road, and that his miscarriage in 1848–49, was the fault of his guide, not of the country; and he was determined to solve those questions by the test of actual experiment.

With these views he set out, taking the winter for his time, the west for his course, a straight line his object, the mouth of the Kansas for his point of departure, St. Louis and San Francisco the points to be connected. The parallels of 38° and 39° covered his course, and between these he continued to move west until he reached the Little Salt Lake—within three hundred miles

of the California line; after that, upon a slight deflection to the south, between the parallels 37° and 38°, until he entered California. This may be called a straight line; and so fulfills a primary condition of every kind of road, and especially of a railroad, where a speed of a hundred miles an hour may be as easily attained and as safely run as the third of that velocity in a road of crooks and curvatures.

Snow was the next consideration, and of that he found none on any part of the route to impede any kind of travelling. On the Kansas, the Upper Arkansas, and the Huerfano, he found none at all; in the Sand Hill Pass of the Sierra Bianca, none; in the Coochatope Pass, four inches! and none if he had crossed the day before; and that was the 14th day of December, corresponding with the time, and almost in view of the place, where he had been buried in snow five years before. This solved the question of snow in the passes of the mountains, and showed his miscarriage had been the mistake of the guide, and not the fault of the country. After that—after crossing the Rocky Mountains—the climate changes. A great amelioration takes place, which he knew before, and then fully experienced. The remainder of the route, as has been shown in the view of the country, may be said to have been found free from snow—a hundred miles at a time in one place without finding any; and when found at all, both thin and transient.

And that this was the common winter state of the pass, and not an occasional exception, has been shown by Mr. Antoine Leroux and others, and corresponded with his own theory of snow in the passes.

The Sierra Nevada was the last range of mountain; and there not a particle of snow was found in the pass which he traversed, while the mountain itself was deeply covered. And this disposes of the objection of snow on this route, so formidable in the view of those who have nothing but an imaginary view of it. Smoothness of surface, or freedom from abrupt inequalities in the ground, is the next consideration, and here the reality exceeded the expectation and even hopes, and challenges incredulity.

Here is a section of the route, above seven hundred miles long, being more than half the distance to California, in which there is no elevation to arrest the vision—in which you might look down in the wide distance, (if the eye-sight was long enough,) and see the frontier of Missouri from the mouth of the first pass in the first mountain—being more than half the length of the road. This would do for a start. It would satisfy the call for a fair surface at the commencement. This first pass is called the Sand Hill, or Robidoux, through which Fremont entered the valley of San Luis; and the way so low and level as to be seen through. And through that valley, and its continuation, (the Sahwatah,) to the Coochatope, the ground is so smooth as so present no exception to its level but the natural curvature of the earth.

More than forty loaded wagons went through it in the summer of 1853, twenty of them guided by Leroux for Captain Gunnison, the rest by emigrant families, without guides. But more than that—the buffaloes have travelled it always.

This is enough to show that the Rocky Mountains may be passed without crossing a hill—that loaded wagons may cross it at all seasons of the year. In a word, there is no difficulty about passes; the only bother is to choose out of so many all so good, both in themselves and in their approaches. This is enough for the passes; with respect to the whole mountain region, and the difficulty of going through it, and upon different lines, we have also the evidence of facts which dispense with speculation and assertion. That

region was three times traversed, and on different routes, by Messrs. Beale and Heap, in the summer of 1853.

It happened thus: When they had reach the east fork of the Great Colorado of the West, and were crossing it, they lost, by the accident of an overturned canoe, their supply of munitions, both for the gun and the mouth, and were forced to send back to the nearest settlement for a further supply. That nearest settlement was Taos, in New-Mexico, distant three hundred and thirty miles; and that distance to be made upon mules, finding their own food, which had already travelled, on the same condition, one thousand miles from the frontier of Missouri; and these mules, (thus already travelled long and hard, without other food than the grass afforded,) now made the double distance at the rate of forty miles a day, still finding their own food, and on the return, bringing packs on their backs. This performance must stand for a proof that the whole mountain region between the Upper Colorado and the valley of the Upper Del Norte is well adapted to travelling; and that in a state of nature; and also well supplied with nutritious grass; and this clears us of the Rocky Mountains, from which to the Little Salt Lake it is all an open practicable way, not limited to a track, but traversable on any line. Loaded wagons travel it in a state of nature. The valley of the Colorado is either level or rolling; the Wahsatch and Anterria ranges are perforated by incessant valleys; and from the Little Salt Lake to the Great Sierra Nevada, as explored by Fremont last winter, the way is nearly level—a succession of valleys between the mountains—and terminated by a superb pass, debouching into the valley of San Joaquin.

This completes all that is necessary to be shown in favor of the smoothness of the way—its equality of surface, throughout the whole line; although it attains a great elevation, and lands you in California, in the rich and settled valley of San Joaquin, proximate to the southern end of the gold mines. Not a tunnel to be made, a mountain to be climbed, a hill to be crossed, a swamp to be seen, or a desert or movable sand to be encountered in the whole distance."

We shall be glad to publish any suggestions, on this subject, from any quarter.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

CROPS IN VIRGINIA.

MESSRS. EDITORS: It is several months since I last addressed you. Bleak winter has driven me within doors, and now, with the mercury standing at 16° Farenheit, I seat myself, not to give you an essay on agriculture, but to write of things past, present, and in prospect, in our beautiful valley.

This portion of our valley has not suffered from drought so much as the counties below us. The crop of wheat in the upper part of our county was a full average, and of fine quality. The counties of Augusta, Rockingham, Shenandoah, Page, Jefferson, etc., if I am correctly informed, fell short one third to half crops. The corn crop was equally short, and taking the valley range, will not average half crops. Grass was also very short. Upon those crops the graziers are dependent, and as a necessary consequence, there will not be fed in the lower part of the valley over one half to two thirds of stock cattle usually wintered there. It is computed that last year some 40,000 head of

stock cattle were driven down the country. This year about 28,000 passed through our county, and several thousand of them were driven back for want of a market. It is fair, however, to presume, that the stock on hand this year in the lower part of the State is better than that of last year, with much less to feed them. For some weeks past, many lots of very fine beeves have been passing down to the Baltimore market from the counties of Botetourt, Roanoke, Wythe, Montgomery, Pulaski, etc., etc., which counties are famed for the finest cattle raised in Virginia. The Cloyd's, Kent's, Crocket's, with many other gentlemen in the south-western part of the State, are celebrated for their fine stock. Many of their beeves would average net 1000 lbs., finely fatted, and command the highest prices. There is also much fine beef driven from the counties of Rockbridge and Augusta, with the entire range of valley counties. Last year every description of cattle was high and in great demand. This year there is little inquiry, and prices for stock-cattle have fallen off from one fourth to one third, and, notwithstanding every description of produce is high, there appears a pressure in money matters. Speculation has run too high. Time will bring things right. The price of bread-stuffs has ruled high all season, contrary to my expectations, and from present indications, will continue to do so till spring, and it may be till the coming harvest. Your canals are, I suppose, now closed with ice; your supplies will be cut off from the West. The surplus here is small, and owing to the continued dry weather, and now the freeze, the stock of flour on hand must run short; and I am deceived if prices do not continue to go up. You may rely on it. The stock on hand here is inconsiderable. The high prices heretofore have induced farmers to push off their stock as fast as they could get it ground. I own a Merchant mill. My stock on hand will be out before Christmas, and I do not know where I can buy 1000 bushels of wheat. I hear that this is the case with the mills around me. Wheat commands in the interior $1.50 per bushel; corn, 70 to 75 cents, and in some places $1; oats, 45 cents; rye, 75 cents; all scarce, and in demand. Pork worth $5 to $6 as in quality. Should the winter prove severe, I fear there will be suffering before grass comes again. The stocks of cattle, horses, hogs, and sheep are about as usual, with less to feed them. There has been an unusual number of sheep driven down the valley the past season, from the western part of the State, from Tennessee, and the mountainous parts of North-Carolina. They were mostly a common article, bought at an average of $1 per head to $1.25, and sold at $1.75 to $3.50; 40,000 were supposed to have been driven through our county. It is a matter of surprise that the farmers of East-Tennessee, and the northern portions of North-Carolina do not pay more attention to stock raising. They send in hordes of things here—two, three, four, and five years old, remarkable only for stag-heads and horns, with bandy legs, of small bone—any thing but comely animals. Our good farmers don't like to buy them, and will not when they can do better. One of Kent's fine beeves at the same age, is worth two of them. They are driven mainly to Eastern Virginia, and generally at four years old fatten well, but grow but little. There may be exceptions, and no doubt are, but I speak of this as applying to most of the cattle driven from East-Tennessee, and the border of North-Carolina adjoining.

I informed you some time since, that we were building a Branch Canal from the James River and Kanawha improvement, a distance of twenty miles. We have completed that work to within six and a half miles of Lexington. Owing to the pressure on the money market, our work is now progressing slowly; we are dependent for funds for the completion of the Canal

on bonds guaranteed by the James River & Kanawha Co. The payment of those bonds is based upon the tolls over the entire line on produce passing over our Canal. First paying the James River Co. $5000 per annum. It is computed that the surplus tolls will pay principal and interest in thirteen years from this date. From an experience of one year's business, we do not hesitate to say that an investment in those bonds is equal to Virginia State stocks. The interest will be paid semi-annually, and the redeemed within the next thirteen years. Last year the tolls amounted to near $16,000, and they will continue to increase as the canal is completed. We want capital here to occupy some of our fine sites for water power. Can you not send out some of your surplus funds, and energetic citizens, to build up our waste places? We want furnaces, forges, and factories. Much of the raw material is here. We lack capital to make it available.

Your obedient servant, etc., H. B. Jones.

Rockbridge Co., Va., near Brownsburg, Dec. 5, 1854.

P.S.—Mercury down to 16°; at sunrise, 22°; at 4 P.M., and at 5 P.M., 19°; wind high for two days. The night will be cold. 6th, mercury 17°.

CORN THE STAPLE CROP OF OHIO.

Mr. Mansfield, in an address to the Highland County (O.) Agricultural Society, at its late Fair, thus speaks of their great staple, and the necessity for improvement in its culture:

"In this State, and in the whole Valley of the Ohio, Indian corn is the most important staple. In the five States of Ohio, Kentucky, Illinois, Indiana, and Tennessee, are raised 280,000,000 bushels of corn—one half of the whole raised in the United States, and three times as much as are raised in the same States of wheat, oats, barley, and potatoes, together. Corn is, therefore, the great staple of the Ohio Valley; and if we can improve its culture, we add more than in any other way to the products of agriculture. Is that impossible? In examining the statistics of this State you will find some facts bearing strongly on this point, and quite startling to the curious inquirer.

We find, *first*, that the *average product per acre* is 37 bushels, namely, 1,664,429 acres, producing 61,171,282 bushels; the highest being 50 per acre, in the counties of Butler, Warren, and Fayette; and the lowest 20 bushels, in the counties of Huron, Wayne, and Williams.

We next find, by turning to the proceedings of agricultural societies, that 150 bushels per acre have been repeatedly raised, and that 100 bushels is no uncommon crop. Thus we have two facts worth consideration, the sum of which is, that *the average corn crop of Ohio is only one fourth of what it might be under high cultivation, on the same breadth of land.* Is this a state of things that ought to exist? But some one will ask in the popular language, Will this superior cultivation *pay?* Will superior cultivation pay its costs? If it will *not*, your agricultural societies ought not to exist. No premiums should ever be offered, and you should contented to let dock, thistles, and iron weed grow where they will, and leave nature alone to raise your crops. Why, gentlemen, it is only on the supposition that superior cultivation *is* valuable, that you attempt any agricultural improvement.

But it is not to be denied, that in the Pioneer State, in the period when

lands were clearing up, it *was* the doctrine, that nature should be left to do the work of growth; for lands were cheap and labor dear. But Ohio has passed that period—at least as regards farms. Farming land is worth $20 per acre, on an average, and there is too much capital in land to lie idle. The time has come for high cultivation, the time has come when it will pay; when, if rightly applied, *culture* put on land will pay better than any other species of human labor."

ROTATION IN COTTON-CULTURE.

The richest soils, if not properly cultivated, will lose more or less of their fertility. Every one of the older States, north and south, is suffering from this depreciation in the value of their soils. At the same time, it is true that there is no necessity for suffering such a state of things to exist, and it is now in the power of the landholder, everywhere, to improve the condition of his lands, and that, too, without any immediate and excessive expenditure. The following is the substance of a system of rotation by which the impoverishment of the soil is effectually prevented, which has stood the test of several years of practice.

One hand is allowed to every twenty acres. The land is divided into four parts. Grade and ditch as circumstances may require. Next, allot five acres to each hand in cotton, ten acres in grain, and let five acres lie in fallow. Plant cotton on the same land once in four years, and always on fallow land, with a dressing of five hundred bushels of compost or stock-yard manure per acre, spread on the land broadcast, and incorporated with the soil uniformly in the process of bedding out the rows. The residue of the cotton-stalks, leaves, burs, blooms, and limbs, with the seed, except for planting, are all returned back to the same land where they grew. Upon this land the next year plant corn, manuring it with cotton-seed. But to the corn crop, the most important on the plantation, add two acres of the land which was in corn last year, thus giving seven acres in corn to each hand. On the other three acres of that portion that was in corn last year, sow small grain, which upon land thus treated will furnish a sufficiency of oats, rye, and wheat, for the wants of the plantation. Then we have lying in fallow for the next year's cotton crop the three acres that were in small grain last year, and two acres that were in corn.

The following reasons for commending this course we give as set forth by Dr. Cloud in the *American Farmer:*

"In the first place, it embraces all the conditions necessary to sustain the cotton-planting interest within itself, independent of external or foreign aid. To this feature I think there can not be too much importance attached. Again: the several crops succeed each other to better advantage, both as to their culture and healthy growth, than in any other way that we have seen or attempted. It may not be generally understood by planters from practice, because it is not a common practice; indeed, it is of the rarest occurrence, how well cotton grows after one year's rest or fallow. I conceive it to be, in its healthy, vigorous growth, and exemption from insects, more like growing cotton on fresh land. Nor will this be difficult for any planter to comprehend, when he recollects that on the fallow I spread five hundred bushels per acre of good stock-yard compost, or its equivalent.

I am sure I shall have no difficulty in persuading any planter that corn grows better, bears better, and is less trouble to cultivate after cotton than after any other crop. So well, indeed, does it do after a crop of cotton that has received a dressing of five hundred bushels per acre of manure, that it is yet a matter of uncertainty with me, after twelve years' experience, whether or not a good corn crop is not more certain without than with the seed; and if we have drought it is certainly best not to use the seed on corn thus treated. Then we have the seed to add to our compost heap for our cotton. Then again, the effect of the corn and small grain crops on the land being about the same, I prefer placing the small grain after the corn, as it does better after corn than corn does after it. After the small grain, the land lies one year in fallow. I have a theory about this four years' shift and one year in fallow, in regard to its curative influence upon the diseases of the cotton-plant. Of course I can not go into its explanation here, but I give it as my opinion that if the same land throughout the country was planted in cotton but once in four years, it would prevent the insect of rust; I am sure it would of lice, and I think it altogether probable it would do much toward relieving it from the injury of the boll-worm.

Under this treatment the plantation is every year improving. From the extent of pasturage which it affords, and the large amount of corn raised on the plantation, an average of two hundred and fifty bushels per hand, there will be no manner of difficulty in raising all the stock—hogs, mules, and cattle—that are needed on the plantation. It has been objected to this system, that in the extent of pasturage afforded, prairie and clay land would become too much trod by the stock, causing such land to run together and break up cloddy. I am confident the objection is unfounded, as the great object of the system is to accumulate on the land the largest possible amount of vegetable matter, which, while it keeps the land loose and friable, contributes so largely to the luxuriant and healthy growth of cotton. These objections, that fail to stand the theory and science of agriculture, fall to the ground as impotent and futile when we examine the same system (in principle) in successful practice in the States of Tennessee, Kentucky, Ohio, etc., on calcareous clay lands, raising by pasturage, etc., not only mules, horses, hogs, and cattle for home consumption, but for all our cotton planters. There is an incompatibility here certainly. The only precaution necessary is to prevent stock running on the land while wet with rainwater standing on it.

There is nothing more easy than to account for this false alarm among cotton-planters. See the sedulous care, if you please, with which they have drained the vegetable strata of their fields for the last forty years; each row is a perfect drain, not of water alone, but of vegetable mould, the life's-blood of the land; the cotton and cornstalks generally burned; thus denuded and leached, it is not surprising that the hoof of a hungry cow should poison it!

It is further objected, by those otherwise approving the system, that it will not make cotton enough; that it does not lot sufficient land to secure every year a full crop of cotton. To this objection we simply oppose at first this fact. No man in this country, on the same quality of land, has realized from 1844 to 1853 inclusive, to the same proportion of hands which I have, notwithstanding I have been experimenting all the time. If I have not made as many bales of cotton, which is improbable, I have raised that which cotton had to supply necessarily. This is obvious in the substantial improvements on the land, and its increased value, at least five hundred per cent; not that I could simply sell it for that much over and above its cost twelve years ago,

but it is its absolute annual production. Nor does it possess any artificial advantages of railroad or city value, as land in sight of it of the same quality, and just as valuable in 1843, under the "kill and cripple policy" of the country, sold last year at less than $6.25 per acre."

ARTIFICIAL MANURES.

We have often alluded to the strong temptation to fraud in the manufacture of various fertilizers, and have advocated the policy of sworn examiners to mark every box and bag of it according to its merits. There is no force whatever in the pretense so shamefully urged by some of those who are interested, that self-interest will lead them to be honest. Such considerations are no more effective with the makers and sellers of phosphates than with makers and sellers of watches, or of any other article. Selfishness is the most miserable motive to be honest that a man could devise, while fraud can seldom if ever be detected by ordinary means. Those who rest their own character on such a plea, ought not to be trusted beyond the length of a halter.

We are led to refer again to this subject, by noticing some very conclusive statements in reference to the subject in a recent *Country Gentleman*, and we heartily commend the advice which is given at the close of the extract by our learned and judicious brother:

"From the Transactions of the Highland Agricultural Society of Scotland, we learn that a Mr. G. W. Hay, of Roxburghshire, being desirous of trying experiments with various manures, put himself in communication with a dealer or dealers in 'agricultural manures.' Among the substances to be employed by Mr. Hay were super-phosphate of lime, nitrate of soda, phosphate of soda, sulphate of potash, phosphate of magnesia, sulphate of ammonia, and muriate of ammonia. When the parcels of chemicals furnished by the respectable people of whom they were bought, came to be examined, the nitrate of soda was found to contain only 56 lbs. of that substance in every 100 lbs.; the phosphate of soda only 6 lbs. in the 100 lbs.; the sulphate of potash 60 lbs.; the sulphate of ammonia not quite 9¾ lbs.; the nitrate of potash (saltpetre of commerce) about 11½ lbs.; the phosphate of magnesia 2¾ lbs. (!!); and the muriate of ammonia 54 lbs. only. As to the super-phosphate of lime, as it was called, it contained only 4 per cent of soluble phosphate of lime; the other 96 lbs. consisting of water, gypsum, siliceous matter, some kind of free acid, and insoluble phosphate of lime, a perfectly useless substance.

When Mr. Hay ventured to complain of the fraud thus practised upon him, he was coolly informed by the dealers that they could not think of taking their rubbish back. They stated that what he had bought of them was '*the usual quality for agricultural purposes*,' and contained 'the quantities suitable for plants.' That is to say, in the opinion of the dealers, the quantity which is *suitable for plants* is 2¾ lbs. in every hundred of phosphate of magnesia, 9¾ lbs. of sulphate of ammonia, 4 lbs. of super-phosphate of lime, and 6 lbs. of phosphate of soda. This insolent answer is pretty good proof that some, perhaps most, dealers in 'agricultural manures' take it for granted

that the agricultural community are easily imposed upon, and may be cheated and fleeced to almost any extent.

By every case of detection and exposure of such frauds, farmers will be more and more persuaded of the expediency of manufacturing their fertilizing substances, as much as possible, at home. They will turn their attention more and more to saving, and putting into available or usable forms, all the urine and excrements upon their premises; to saving their barn-yard manure from the wasting influences of exposure to winds, and rains, and sun; to composting; and to the manufacture of chemical manures under their own eye. That this latter can be done to same extent is evident from the directions given in the last volume of *The Country Gentleman* in regard to the composition and domestic manufacture of what is known in Great Britain by the name of 'Economical Manure.' By every case of exposure of such frauds, the number will be diminished of those who purchase annually various quantities of guana, super-phosphate of lime, poudrette, etc., while the guano of their own hens and all the animal excretions on the premises are allowed to go entirely to waste."

A FINE YIELD OF CORN.

Mr. John Q. Hewlett, who has a farm about four miles from this city, on the Frederick road, has just measured the corn gathered from three acres of a field of eighteen acres. The corn was heaped and shaken twice, in accordance with the old rule; twice before and once after Christmas. The product of the three acres was 46 barrels, or $15\frac{1}{3}$ barrels, or $76\frac{2}{3}$ bushels, per acre.

The field had heretofore been improved by a liberal dressing of animal manures, the ploughing in of a green crop, and the application of one hundred bushels of oyster-shell lime, and had been set in timothy. Last year, owing to the lowness of the ground, and the thorough manuring which it had previously received, a heavy second growth, or after-math of timothy, grew up, fell down, and, by the force of its smother, destroyed the timothy, which was followed by a luxuriant crop of blue grass. Last fall the blue grass was ploughed in some eight or ten inches in depth, and the inverted soil left exposed to the meliorating influence of the winter's frosts. This spring the field was rolled, harrowed until a perfectly fine tilth was obtained, and then planted with corn, *without any manure.* The result of the product of three of the eighteen acres we have already detailed, and we will add that it is estimated that the remaining fifteen acres will yield ten barrels on an average to the acre.

Now, what think you enabled this field to yield so luxuriant a crop of corn during the past season of drought? Why, the thorough system of improvement to which it had been subjected some years since; to the application of concentrated organic manures; to turning in green crops; to liming and to deep ploughing, thorough pulverization and judicious culture of the corn.

The crop of timothy cut in 1853 yielded more than two tons to the acre; its produce of corn in 1854 we have already stated, and yet this field in 1849, when the farm came into its present owner's possession, would not have brought more than four barrels of corn to the acre!

Can any one, after this plain statement of facts, doubt the policy of

thoroughly improving land? Can they doubt that true economy is thereby conserved? Can they doubt that money thus laid out will not came back—not only the principal, but with a heavy interest? We think that no one who is capable of forming a correct opinion can entertain the slightest doubt upon the subject. We know that every dollar judiciously laid out in the improvement of land will pay, and pay well.—*American (Baltimore) Farmer.*

HOME MANUFACTURE OF POUDRETTE.

The contents of privies, commonly known under the name of night-soils, furnish exceedingly powerful manure when properly manufactured; and under right management, the process will destroy all the effluvia arising from those deposits, and render the closet entirely inoffensive.

When a reservoir or small stream of water is at command, so that a current may be made to sweep through several times a day and carry off the contents into the manure-yard, or into a covered bed of peat, or a compost heap, this forms perhaps the most perfect mode of removal. An essential requisite, however, is freedom from the influence of frost, and the closet should therefore be connected with the dwelling where the reservoir of water may be kept from freezing, and from which there should be an underground channel of considerable size and slope. We have known all this to be perfectly accomplished by means of a lead cistern in the upper story, which was kept supplied with rain-water at all times from the broad roof of the house, and which was sufficient beside for baths, washing, and all other domestic purposes.

When a current of water can not be used, the next best contrivance is to form a tight box, of matched pine plank, and give it two or three coats of coal-tar, so as to render it durable, and proof against moisture and warping. It is to be placed on two runners like that of a sled, made of plank or scantling, to the forward end of which a chain and iron hook are attached, so that it may readily be drawn off by a horse. This box must be of such a size as to fit a cavity made on purpose under the building.

The next thing is to provide a supply of some efficient deodorizing substance. Dry saw-dust or thoroughly dried peat does tolerably well, with the occasional addition of ashes and powdered charcoal. Charcoal dust alone is much better, and if daily applied in small quantities, will nearly destroy all smell; but it is absolutely essential to success that a full supply of this material be kept near at hand in a large box or hogshead in a shed or outhouse, where it shall be always dry and in a condition to apply every day, summer and winter. Animal charcoal is still more efficient than common charcoal, and may be made to form a portion of a material made as follows: Make a pile of peat, turf, old straw and brush, mix with tanner's shavings and broken bones; let the pile become dry enough to burn, and then cover it with sods and set it on fire. It should be suffered to burn with a slow, smothered combustion, so as to char without consuming the materials. When the process is completed, the whole heap, including the turf covering, should be well mixed together and broken fine, and then placed in a large box under shelter, for daily use. Any portion of clay introduced by means of the turf, and well dried, forms a powerful absorbent of fetid matter. As often as may

be convenient, a horse is hitched to the hook and chain, and the whole is drawn off into the barn-yard, where it is quickly discharged by turning the box upside down; and after covering the bottom and sides with the prepared material already described, it is replaced as before. The strong manure thus obtained, will, if well mixed, possess but little odor and may be used directly, or may be mixed with common manure in the compost heap. Durable plank should be placed under the runners, to prevent their sinking into the earth, and enable the horse to start the box easily. It is said that those who are employed to obtain the materials for the wholesale manufacture of poudrette, throw in, before commencing operations, a few quarts of a strong solution of copperas, which immediately neutralizes effluvia, and adds to the value of the manure.

Since the above was written, we have received the following:

"The different modes of saving as well as making manure, very properly engage the attention of agriculturists to a great extent. There is one mode of saving manure, however, which is very much overlooked. The farmers generally, in building a 'palace' for the accommodation of the household, either dig a pit to a great depth, or a shallow one with a movable building, to be removed as often as the pit becomes filled. In the former case, there is fitted up a complete nuisance (after a year's existence) and a trap to frighten mothers and nurses. The latter is a nuisance from the beginning, and a subject of complaint almost everywhere. The plan I have adopted is simple and cheap—leaving the 'palace' as sweet as any chamber in the house, and productive yearly of a tank of manure worth twenty-five dollars—a species of poudrette, I venture to say, more fertilizing than any that can be purchased.

I have sunk a tank or pit, ten feet square and four feet deep, and lined with plank; stone or brick walls would perhaps be better. Upon transverse beams is built the 'palace,' five feet square. From the kitchen and wash-house, I have underground sewers emptying into this tank, through which all the slops of every description pass. The seat is fixed on hinges so that the whole top may be opened up, and at this opening is deposited all the dirt accruing about the house including the ashes from two fires. The dirt and ashes absorb all the slops and moisture, and prevent the slightest unpleasant smell. This tank may be filled once or twice a year, and each filling would be worth to the garden the sum before mentioned. It is astonishing that this is so much neglected by persons even who know the value of manures, and can appreciate cleanliness and convenience.—*Country Gentleman.*

CHARCOAL A DISINFECTING AGENT.

We have often made suggestions on the use of charcoal in stables, closets, etc., and copy some experiments below, made by an English gentleman, and reported in the London Journal of the Society of Arts. The account is as follows:

"My attention was particularly drawn to the importance of charcoal as a disinfecting agent by my friend John Turnbull, Esq., of Glasgow, Scotland, the well-known extensive chemical manufacturer. Mr. Turnbull, about nine months ago, placed the bodies of two dogs in a wooden box, on a layer of charcoal powder a few inches in depth, and covered them over with a quan-

tity of the same material. Though the box was quite open, and kept in his laboratory, no effluvium was ever perceptible; and on examining the bodies of the animals at the end of six months, scarcely any thing remained of them except the bones. Mr. Turnbull sent me a portion of the charcoal-powder which had been most closely in contact with the bodies of the dogs. I submitted it for examination to one of my pupils, Mr. Turner, who found it contained comparatively little ammonia, not a trace of sulphuretted hydrogen, but very appreciable quantities of nitric sulphuric acids, with acid phosphate of lime.

Mr. Turner subsequently, about three months ago, buried two rats in about two inches of charcoal-powder, and a few days afterward the body of a full-grown cat was similarly treated. Though the bodies of these animals are now in a highly putrid state, not the slightest odor is perceptible in the laboratory.

From this short statement of facts, the utility of charcoal-powder, as a means of preventing noxious effluvia from churchyards, and from dead bodies in other situations, such as on board a ship, is sufficiently evident. Covering a churchyard to the depth of from two to three inches with coarsely powdered charcoal, would prevent any putrid exhalations ever finding their way into the atmosphere. Charcoal-powder also greatly favors the rapid decomposition of the dead bodies with which it is in contact, so that in the course of six or eight months little is left except the bones.

In all the modern systems of chemistry, such, for instance, as the last edition of Turner's 'Elements,' charcoal is described as possessing anti-septic properties, while the very reverse is the fact. Common salt, nitre, corrosive sublimate, arsenious acid, alcohol, camphor, creosote, and most essential oils, are certainly anti-septic substances, and therefore retard the decay of animal and vegetable matters. Charcoal, on the contrary, as we have just seen, greatly facilitates the decomposition of any organic substances with which it is in contact. It is, therefore, the very opposite of an anti-septic."

ILLUMINATION UNDER WATER.

That science is progressive is apparent on all sides. Among other subjects of great interest, this has received its share of attention. The November number of the American Journal of Science and the Arts contains interesting statements on this subject. We are informed that at the Lake D'Enghien, M. Duboscq, the successor of Soleil, performed an experiment of this kind before many competent observers. The electrodes of carbon were placed in a glass globe, being connected with one of Duboscq's regulators, which communicated with the battery by a copper wire covered with gutta-percha. The globe, submerged to the depth of sixteen and one half feet, spread light over a circle of sixty-six feet diameter, and it remained constant for two hours, after which the carbon required replacing.

The idea of this process was suggested by an agent of a company that had been engaged in exploring the bottom of the Mediterranean where the battle of Navarino took place. The diver usually remained beneath the water three quarters of an hour, after which he came up to breathe and rest; his light was an oil lamp placed on the head of the diver, and fed with air proceeding from his respiration, whence it was in a variable current, and was

often extinguished, requiring him to go up and relight. Duboscq's arrangement was devised to avoid these inconveniences. It is made light, so that the diver may carry it in his hand; and at the same time it is strong, and well secured hermetically, to resist a pressure of one hundred and eighty feet of sea-water. It consists of a cylinder of strong glass secured to a brass foot, and surrounded with a gutta-percha sack. The light passes out through a large plano-convex lens, the convexity being inward, the focus being so arranged that the rays escape nearly parallel. As the lamp is movable, the diver walks about with it, and places it where he wishes to make a search; and as it is only necessary to bring the electrodes near one another to light it, the diver need only to turn a small screw to continue the light for two hours, which is more than twice as long as he can remain at the bottom.

This beautiful invention supplies a want which has always been felt by persons engaged in operations with the diving-bell. A vast quantity of property now lying on the bottom of our large rivers, bays, and lakes, may be recovered by the use of submarine armor and these electric lamps. In seeking for nuggets of gold in the deep pools of streams in California, these lamps may also be advantageously employed. They will likewise materially aid the engineer in arranging the foundation of works that are to be erected in deep water. In recovering the body of a person who has been drowned, they will be eminently useful; in short, the introduction into use of this submarine lamp is another of the beautiful contributions that science is constantly offering to man for the promotion of his happiness and prosperity.

SUBSTITUTE FOR RAGS IN PAPER-MAKING.

Our exchanges from the Atlantic States contain favorable notices of the newly-discovered paper plant which grows spontaneously and abundantly in Canada. We do not entertain a doubt that this plant, which appears to have as many *aliases* as a pickpocket, will supply the material for the manufacture of paper that will surpass in quality and economy that now made from rags. In Canada, the name commonly given to the plant is "Cudweed," another is "Life-everlasting." In the notice we now give, which is taken from a Savannah paper, the botanical name is said to be "Gnaphaluno." The writer of this notice, as will be seen, speaks very favorably of this plant as a substitute for rags in paper-making:

"It is said that the experiment to make paper out of an American plant called 'white top,' or 'immortelle,' has been successful. The botanical name is Gnaphaluno, and the paper is therefore called 'gnaphalic paper.' The plant is very abundant in Canada. The paper is glossy, smooth, and thin, and evidently much stronger than that kind in the manufacture of which cotton is so largely used. The stalk as well as the flower of the plant may be employed, but from the white silky flowers alone a finer and whiter article can of course be produced. The manufacturers assert that, without taking into consideration the difference of the cost of materials, paper may be made from this plant at 12½ per cent less expense than rags. The adhesive qualities of the plant are such that in the manufacture of the paper no animal matter need be used, and a good surface is obtained without sizing."

We find the foregoing in the *Louisville Journal*. We do not know about

the *aliases* spoken of, except so far as some compositor or proof-reader is responsible. The true name is GNAPHALIUM, and it grows "everywhere." The *luno* must have been contrived by some moon-struck typo. The common, or English names of plants are never reliable. Every locality has its own nomenclature. The "Ladies' Slipper" of one region, is "The Toad Flax" of another, and so on.

We have not the confidence of our learned brother at Louisville, in the matter of substituting any thing for *flax* in the manufacture of paper, but quere whether an economical process may not perhaps be devised for making paper from the vegetable itself, without a previous operation for converting it into *flax*, or still more into a web. Perhaps, too, something may be accomplished by mixing raw cotton and prepared flax together.

NEW PLAN OF BREAKING-IN HORSES.

A NEW system of breaking-in horses, by means of a very few lessons, and so as to preserve all their precious qualities, has come into use, and what is singular is that the author of it is a lady, named Isabelle. Having a great liking for horses, Madame Isabelle some years ago began studying the different systems employed in breaking-in horses, and came to the conclusion that they were all more or less defective. She then sought for a plan of her own, which should render the horse more tractable, by developing its intelligence; and she succeeded in discovering one so perfect that the most restive horse is reduced to obedience in a very short time, and without the slightest ill-treatment. Her plan, as is almost always the case with things really useful, is very simple. She begins by making the horse carry his head high, and perpendicularly, whereby she prevents the weakness caused by the constant binding of the neck, gives free play to the muscles in the neck, and allows full action to be exercised over the mouth. Then she places on the horse a surcingle, surmounted by an iron rod about fifteen inches long, which is bent about four inches forward at the summit. On each side of the rod are placed four rings, destined to receive the reins according to the height that may be desired. The horse soon gets accustomed to this check, and it exercises a great moral effect on him. He places his head in such a manner as not to suffer from the bit in the mouth, and thereby soon gets accustomed to being held in hand by his rider or driver. The surcingle also promptly accustoms him to adopt the best movements, and to advance when desired without offering any resistance. The breaker-in remains at the left of the horse, and is armed with a whip with a spur in it. After forming her system, Madame Isabelle went into Germany, and practised it with marked success on horses belonging to Prince de Lichtenstein, at Vienna. From Vienna she went to Russia, and there stopped two years. In the course of that time she rendered completely docile all the most restive horses of model cavalry regiment at St. Petersburg, as well as those of the Emperor Nicholas. Recently she returned to France, and, having explained her plan and stated its results to the Minister of War, she was, by the special direction of the Emperor, who was consulted, authorized to practise it on a number of young horses of the regiment of guides, and with an equal number of recruits who had recently joined the regiment. The lessons were given under her direc-

tion at the riding-school of the Ecole Imperiale d'Application d'Etat Major' After the fifteenth lesson the horses manœuvred with the tranquillity and precision of old troop horses. A few days ago, Colonel Fleury, who commands the regiment, manœuvred the horses and recruits, and every one of the usual cavalry movements was admirably executed.—*Mark-Lane Express.*

GALLS ON HORSES.

Some horses are more predisposed to galls than others, but even the most liable to injury in this respect may by care be kept perfectly sound. Bad harness is the great cause of galls. In order to save a few shillings in re-stuffing an old collar, getting camel's-hair pads, or, perhaps, a new collar, many a valuable horse has been materially injured, and ever afterwards particularly liable to sore shoulders. The collar should be frequently examined, inasmuch as it is very likely to become hard and lumpy. A little pounding will generally remove the difficulty, and render the collar soft. If the horse is known to be predisposed to sore shoulders, camel's-hair pads should always be used. Heavy and unsteady work is also a frequent cause of galls. A man unused to labor can easily blister or gall his hands, while he who labors habitually suffers no inconvenience. So it is with horses; they have, perhaps, done little or nothing during the winter, and, when the busy season comes on, they are put to "breaking up," or other heavy work, and, as a natural consequence, their shoulders are galled. Could any other result be expected? Light work, till their shoulders are hardened, would be a more humane and profitable course.

Bathing with salt and water is a good thing to harden the shoulders. Some prefer to bathe the shoulders in the morning, previous to going to work; but we think it is better to do it at night, and wash it off with cold spring water in the morning. Otherwise the particles of salt are apt to adhere to the collar or to the hair, and act somewhat as would fine sand in a person's boot. Of course, the poor horse is allowed to rest his weary limbs on the Sabbath; for, as experience has fully demonstrated, neither man nor beast can labor seven days in the week with impunity. On Saturday night, therefore, the shoulders should be thoroughly bathed with a saturated solution of salt and water, washing it off on Monday morning before commencing work. These precautions are particularly necessary where the skin exhibits tenderness, or becomes knotty or thickened. A few minutes' labor, night and morning, is all that is required, and it can not be better applied.

In case of actual sores, or where the skin is broken, it is desirable that the horse be allowed to rest a few days; but if this is impossible, the collar must be so padded as not to touch the sore. It would seem essential that the sore be covered in some way, so as to keep out the dust and prevent flies from troubling it. We never found any thing answer the purpose in this particular. If any of our readers have been more fortunate, we should like to hear from them. A solution of alum is good to bathe the sore with, but we prefer white vitriol, (sulphate of zinc.) We know of nothing so cooling and healing. A tea-spoonful should be dissolved in a pint of water, and the sore be kept constantly moist with it. For this purpose, it will be necessary to take a bottle of it into the field with you, and to keep a moistened rag on the sore all the time. Act on these hints, and your teams shall praise you.—*Rural New-Yorker.*

ANATOMY AND PROPAGATION OF MOSQUITOES.

At a recent meeting of the Society of Natural History, in Boston, Dr. Durkee, of that city, exhibited under the microscope the rostrum or sting of the common Mosquito, (*Culex pipiens.*) The Doctor remarked that one of the most remarkable features in the anatomy of the mosquito is that the parts which constitute the mouth are elongated, so as to form a beak extending horizontally, like that of some birds. The beak or sting is about half the length of the body, and to the unassisted eye appears to be very simple in its structure. When examined with the microscope, however, it is found to be composed of seven different parts, which are comparatively stout on one edge. These parts vary in length, and can be separated from each other without much difficulty. They are broad at the upper part, where they are united to the head, and they gradually taper to a point. One of the parts is a tubular canal or groove, in which the others are lodged when the proboscis is not in use. Dr. D. stated that he had not been able to find any appearance of teeth, except on the two longest pieces; in these he had found them near the tip. The two longest pieces, also, are marked by transverse lines, extending from one edge to the other, throughout their whole length.

Cuvier and others state that the male mosquito does not suck blood. From repeated examinations, Dr. D. has satisfied himself that the male has no sting, and consequently can not draw blood. The female alone is endowed with this organ. The male lives upon the juices of flowers and plants.

Mosquitoes are propagated only where there is water. The eggs, deposited in water, go through the larva and pupa state, small collections of shallow water being most favorable for their development. Most of them die in the fall of the year, but some hybernate in cellars and other warm retreats, supported by the oil which they have accumulated during the summer, and with which they are distended in the fall of the year.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

THE STRENGTH OF BEAMS.

When the ordinary mechanic looks into those books which are professedly written for his own especial benefit, and sees there the armies of Algebra and the Calculus drawn up in battle array, presenting at him their bristling weapons of squares, and abscissas, and integrals, he starts back dismayed. There, he knows, is hidden the treasure which he seeks; but his heart sinks within him as he thinks of the tremendous and to him almost hopeless effort required to break down the guard that surrounds it. It is a mistake to suppose that such treatises are immediately useful to the mechanic. They are suitable only for those who, in early life, have enjoyed better advantages than he; who have had more time and opportunities for study than he can generally command. He is a plain hard-working man, with brain quick enough to comprehend and at once realize any thing that is practical and ordinary, but who turns hopelessly from a complicated series of misty mathematical reasonings. The results of these reasonings must be popularized for him. The technicalities of the mathematicians must be removed, and their formulæ translated into his own tongue. It is in the hope of so doing, to a certain

extent, that this is written, and if any one herefrom gets a clearer idea of the very important subject discussed, the writer will feel abundantly repaid.

THE ELEMENTARY PRINCIPLES OF THE CALCULATION OF THE STRENGTH OF BEAMS.

To simplify the reasoning, we will suppose for the present that the beam itself weighs nothing, and consider only the effect upon it of the imposed load.

There are three strains to which a beam may be exposed. 1st. Of extension, as when a weight is suspended from the end of a perpendicular beam. The ties of a bridge-truss suffer a strain of extension. 2d. Of compression, as when a weight rests upon the top of a beam. The braces of a bridge-truss, or ordinary columns are instances of this strain; and 3d, a transverse strain —that sustained for instance by the chords of a bridge-truss. The first two act in the direction of the fibres of the wood, and the third at right angles to them. It is evident that the first depends directly upon the number of fibres composing the beam, without regard to its length, and therefore the tensile strength of beams are as the areas of their cross-sections; that is, if one beam of a certain area will sustain 100 lbs., another beam of twice that area will sustain 200 lbs. The second also depends directly upon the number of fibres; but here enters another element. It is evident that if the beam can be prevented from flexure, and retained in such a position that the weight shall always act in the direction of the fibres, the length is immaterial. But after the beam is elongated beyond a certain point, (which practically is about seven times the diameter of its base,) it is found difficult to retain it in such a position, and this difficulty increases with its length; therefore the strength of beams, to resist a compressive force, varies directly as the areas of their cross-sections and inversely as their length. Resistance to a legitimate crushing force depends upon the lateral adhesion of the fibres, which may be resembled to a bundle of rods, which would not fail if bound firmly together. Thus, for a brace or post, straight-grained is better than cross-grained timber. A fir post will carry three times as much as one of oak; although to resist a strain by extension, oak is much the stronger.

The third, or transverse strain, is in a measure a combination of the first two.

It is easy to find by experiment the strength of a single beam, but in the experiment, the beam is generally destroyed, and besides, a series of experiments can not be entered upon to ascertain the strength of every portion of each one of the myriad structures which the ever-increasing wants of a restless industrial progress demand. A way must be devised by which, from an experiment on one beam, we can determine at all times and readily the value of any similar beam. And this is the province of the mathematician. Into his formulæ enter always and chief the results of the practical experiment, and the *constant* must be known thoroughly and truly, or the formula is useless. Let us endeavor to see how the two are connected.

If a beam is supported at each end and loaded in the middle, the consequence is a deflection more or less from the horizontal. In this deflection different parts of the beam sustain different strains. Of a vertical section taken transversely through the middle, those fibres at the top of the beam will suffer a strain of compression, while those at the bottom will suffer a strain of extension. It is similar to the case of a bended bow, the string of which is stretched taut while the fibres of the bow itself are crushed into each other longitudinally. If we examine the section of fracture of a beam broken across, we shall find the fibres at the bottom literally torn asunder, while

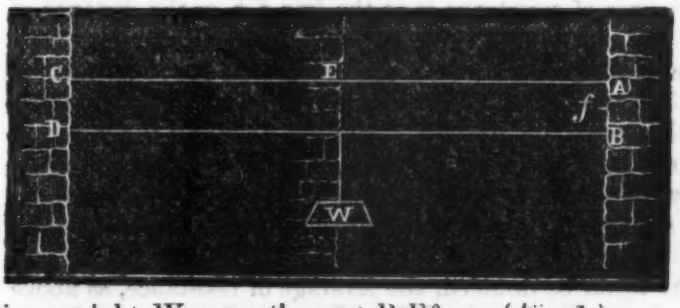
those at the top are forced into each other. It is evident that as these diverse strains approach, they gradually neutralize each other, until finally meeting they harmonize in a line within the beam, in which there is neither compression nor extension. This is called the Neutral Axis, and in regularly shaped beams is generally at or near the centre. It is important in estimating the power of a beam, to ascertain as nearly as may be its exact position; for the strength of the beam is limited to that of its weakest part. For instance: if the resistance to compression is represented by 100, while that to extension is but 50, then the strength of the beam is but 50. Thus, the ultimate tensile strength, that is, the power of the cohesive attraction of the particles, which must be overcome in tearing them asunder, of cast-iron is about 6.5 tons per square inch, while its compressive strength is about 48 tons per square inch. To construct, therefore, a cast-iron bar in the strongest possible form, the quantity of material in the bottom must exceed that in the top, in the ratio of 48 to 6.5; that is, the neutral axis must be located nearly eight times as far from the bottom as from the top.

This, however, for the most part depends upon the material composing the beam, and as such, does not properly come within the limits of this paper.

We will take the case of a beam, the neutral axis of which is in the middle, and the resistance of which to compression is equal to its resistance to extension. This is a perfectly balanced beam, and in the strongest possible form.

A beam may be varied in either or all of its three dimensions, length, breadth, and thickness.

It is evident that the longer a beam is, the other dimensions remaining constant, the weaker it is, and this in direct proportion to its length; that is, if the length be doubled, the strength is halved. Therefore the strength is said to be inversely as the length. Suppose a beam, fastened at each end in a wall, and loaded in the middle. The pressure from the weight is communicated by the particles composing the beam to each other, and so is transmitted to the abutments, or end-supports. It is manifest that the pressure and the resistance to it are equal on each side of the weight and at each end of the beam. Therefore if we calculate the effect of half the weight on half the beam, it will be as though we had calculated the effect of the whole weight on the whole beam, and will be much more simple and comprehensible.



Suppose then the beam A D, loaded at the centre E with the weight 2 W, be divided through the point E, and the part E D with half the weight be removed. What will be the effect of the remaining weight W upon the part B E? (*Fig.* 1.)

B E may be considered as a lever, of which W is the power, and A B the fulcrum. And, therefore, the strain at A B is equal to the product of the length of the lever into the power $= W\,l$ in which $l =$ B E. But W is constant, therefore the strain varies with the length, and hence, as above, the strength is inversely as the length.

Now, to resist this strain we have the inherent strength of the section at A B. At A, as we have seen above, is the greatest strain of extension, and at B the greatest of compression, while at *f* the neutral axis is no strain

whatever. Suppose the beam to be cut by a number of parallel horizontal planes through the points *a b c f d e g*, and that each of these planes represents a layer of the fibres of the beam. Then the strain sustained by the extreme outside fibres at F G, will continually diminish until it becomes nothing at the neutral axis *f*, and the strain upon any intermediate layer of fibres depends upon its distance from *f*. Therefore, if the strain upon the outside be represented by the line F G, the strain upon the whole section of extension will be equal to the triangle F *f* G; and correspondingly that upon the section of compression by the triangle H *f* I. Now, the entire sum of the forces of these triangles may be considered as accumulated at their respective centres of gravity *x* and *y*.

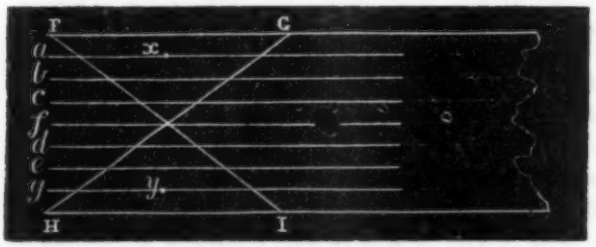


Fig. 2.

Let us at present consider that part of the beam affected by extension alone: *f* is the point at which there is no strain; E the end of the beam to which is attached the weight W, and *x* is the focus of the triangle of extension: *x f* E may then be considered as a bent lever, of which *f* is the fulcrum. The effect of the weight W is to turn the point *x* around the point *f*. This is counteracted by the power P, representing the resistance to extension of the beam. Suppose that the arm *f* E of the lever is four times as long as that of *f x*, then P=E W; for by the principles of the lever the products of the arms into their respective weights must equal each other—that is, *f* E *x* W=*x f x* P, which is the equation of equilibrium. If *x f* be doubled, P must be halved, in order to maintain the integrity of equation. The same is true of the triangle of compression. Where *f* E and W remain constant, the P varies as *f x*; or the power of resistance is as the line *f x*, or the distance of the neutral axis from the centre of gravity of the resisting triangle. This distance, which is the leverage with which the resistance acts, depends, of course, upon the depth of the beam. If the depth is doubled this leverage is doubled, and thus the resistance doubled. But by doubling the depth of the beam, the entire number of fibres is doubled, and this also doubles the resistance. Hence, by doubling the depth of the beam the strength is quadrupled—that is, the strength of beams varies directly as the squares of their depths.

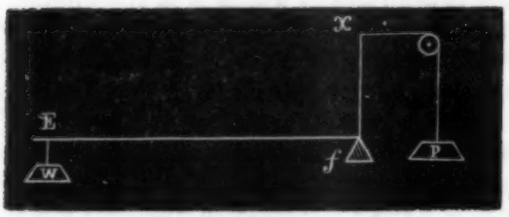


Fig. 3.

If the breadth of the beam be doubled, the leverage of resistance, as above explained, will not, as is readily perceived, be effected. But the number of fibres will be doubled, and with them the strength, which, therefore, will vary directly as the breadth.

We have seen the results of changes and modifications in all the dimensions of a beam—its length, depth, and breadth. Combining them all, and representing the length by *l*, the depth by *d*, and the breadth by *b*, we see that the strength of beams varies as $\frac{b\,d^2}{l}$; which may be taken for the expression of the strength. Now, let us find the weight that will break this beam.

Suppose that we have made experiments on a beam of certain dimensions —for instance, one each side of which is a square inch—and have found that a certain weight C will just break it. This is its ultimate strength. From the result of this experiment, we wish to estimate the strength of other beams, of various dimensions and of similar material. By using the breaking-weight C of this beam, as a unit of comparison with any other whose breaking-weight W we wish to find, we see that the strength of the beam experimented upon is to the strength of the given beam as the breaking-weight known is to the breaking weight sought; or,

$$1 \; : \; \frac{b\,d^2}{l} \; :: \; C \; : \; W\text{—whence}$$

$$W = \frac{b\,d^2}{l}\,C.$$

Rule.—That is, to ascertain the breaking weight of any rectangular piece of timber, fastened at one end and loaded at the other, multiply the product of the breadth and the square of the depth in inches, by the weight necessary to break a piece of similar timber, whose length, breadth, and depth are each one inch, and divide this by the length in inches.

In cylindrical beams the strength is as the cube of the diameter, and in square beams, as the cube of the depth or breath—for it is evident that in both these cases $b=d$.

From a great variety of experiments the value of C has been deduced, and tables are given by authors showing the experimental strength of different timbers when exposed to a transverse strain. The following is compiled from Cresy's Encyclopedia of Engineering. The numbers set opposite each kind of material is the breaking weight of a stick one inch in each of its dimensions, or the value of C as above explained:

Alder,	1590 lbs.	Oak,	1672 lbs.
Ash,	2355 "	" (Canadian,)	1766 "
Beach,	1556 "	Pine, (pitch,)	1632 "
Elm,	1620 "	" (red,)	1341 "
Fir, (Norway,)	2576 "	Poplar,	981 "
" (N. England,)	1102 "	Sycamore,	1608 "
" (Spruce,)	1395 "		

By this table, what is the breaking-weight of a beam of oak, the breadth of which is 10 inches, the depth 12 inches, and the length 14 feet?

$$W = \frac{10 \times 12^2}{168} \times 1672 = 14{,}331 \text{ lbs.}$$

This is its ultimate strength. In practice it should never be subjected to more than one fourth of its breaking weight.

The above formula is applicable to a beam subjected to the aforesaid conditions alone—that is, to a beam fastened at one end and loaded at the other; or what is the same thing, to a beam fastened at each end and loaded in the middle. A departure from these limitations necessitates a change in the formula. It is true, however, that this position of the load subjects the beam to the severest strain to which it can ever be liable; and, therefore, if it be strong enough to resist this, it may be safely trusted to bear the same load in any other position in which it may be placed.

By a reference to fig. 1, it will be seen that the principal transverse strain sustained by the beam A D, loaded by the weight 2 W, is in the middle E, because there the leverage is the greatest. From here it continu-

ally diminishes toward the abutments. The philosophy and extent of this diminution, the effects of a change in the position of the load—of a uniformly distributed load—of a movable or variable load, and other such important matters, will be considered hereafter. C. E.

PLOUGHS: THEIR CONSTRUCTION, ETC.

"We have taken up our pen, with the purpose of preparing an article that shall be of practical value, in respect to this important implement. But it is exceedingly difficult to do justice to our own ideas upon this subject, for the want of means, geometrical diagrams but imperfectly representing some of the principles involved. The most that we shall assume to undertake, just now, is to open the subject for future elucidation, and we shall be "right glad" if our readers will give us the benefit of their thoughts in relation to it. Ploughmakers have a direct interest in the subject.

At almost every annual fair, we used to find that premiums were given for the "best plough." Now, all are fully persuaded that no one plough is "the best," for *all* uses, in the same soil, nor for the same service in different soils. It is equally obvious that different services are required of the plough in the same field, at different states of the seasons and of the crop.

What are these services?

1. The *sward*, or matter consisting of matted roots and soil, variously mingled, are to be turned up. The roots are not to be torn asunder, nor the soil pulverized, but the whole object of the farmer is gained simply by turning a few inches of the soil bottom upwards. If old grass lands are ploughed in the fall and are to remain untouched till spring, the farmer's desire is fully realized by this one process, and all power applied beyond this is labor lost.

2. It may be that the same kind of surface is to be prepared by a single ploughing, in spring, for the reception of the seed. Then a certain degree of pulverization is desired. But how much?

If the soil is sandy and dry, too much pulverization will prove fatal to the germination of the seed. All the moisture is evaporated. In such cases, a plough is wanted that will turn the furrow without entirely destroying the slight adhesion that exists among the sandy particles.

But other soils are more adhesive, and more moist. In such, the plough should be so constructed as more completely to separate the particles of soil; or in other words, to pulverize the soil more effectually.

A difference of great importance also regards the depth of furrow. One shape is best for a shallow furrow, and another for a deeper; or rather a plough that operates well in a shallow furrow, does not of necessity work as well when it turns a deeper furrow. A plough *may* be built to turn equally well a furrow of any desired depth.

Then, there is the cutting of the soil, preparatory to turning it, and the direction of the draught.

All these points are of practical importance. Not one can be overlooked without loss. And we might, perhaps, add one more at least, for extra deep ploughing, to wit, the pulverization of the soil without regard to any change in its position. The object then is merely to stir up, to loosen, without bringing lower strata to the surface, or burying the surface soil beneath the lower

strata. After all these, must be considered the best mode of adapting the handles of the plough, to secure the most perfect control of it.

The mere act of cutting calls for the exercise of science. Go into a book-binder's shop and see the hands at work rapidly cutting up the sheets, perhaps with a piece of bone or horn that is so far from having a sharp "edge," that an insect might crawl on any part of it, and yet the sheets are not torn. If you attempt to use the same tool, you spoil half the paper. Many of our readers have had experience of this sort, in attempts to cut the leaves of books and pamphlets. Some of our readers complain of us that we do not "cut open the leaves." It would be convenient for them, perhaps, but if they will apply a little science, as we intend by and by to explain it, they will not find it a very severe nor hazardous task.

After the soil is properly cut, in two directions, then the process of turning the furrow commences. The wedge is to be driven, the furrow is to be lifted, simultaneously OR successively. Shall these two processes be carried on at the same instant, or one at a time? The latter, of course, requires less power at any one moment, than if the double service were required. Propelling the plough forward one foot involves several distinct actions—that of a wedge in a horizontal direction, lifting it perpendicularly, and also a proper amount of pulverization. The inventor of a plough has regard for each of these results, and must adapt his tool to all the different kinds of soil. For what will thoroughly pulverize sand, will scarcely break a clod of other soil.

To accomplish these various results in different soils, and to any given extent, different mechanical contrivances are requisite. For turning furrow-slices unbroken, in loose soils, certain gentle curves are requisite. For a thorough breaking up and separation of the masses of earth, bolder curves and shorter mould-boards are required.

So far as the resistances to be overcome are concerned, all may be resolved into two terms, adhesion and friction, while on most soils the latter consumes a large portion of the power demanded in this work. Hence, other things being equal, that plough which accomplishes the service required with the least friction, is the best plough; and this friction is determined by mathematical calculation. Here is one of the most important questions for the investigations of the man of science. Experiment must test his correctness, for perhaps in his calculations, which are right as far as they go, he has overlooked some one *factor* or requisite, which will render all his calculations worthless.

First, the requisites of a good cutter. A thin cutting edge, of course, can be driven through soil with less force than would be required to tear it open. But, besides this, the position of the blade is also important. Apply a thin ivory blade, or a table-knife, to the fold of a newspaper, *at right angles to it*, and exert a little force, and you tear the paper anywhere else rather than at the point to which it is applied, and if the paper should be separated in the right place, it will present very rough torn edges. Hold the blade obliquely and apply force, and the roughness of the edges will be sensibly diminished. If the handle is further from you than the point of the blade, and the motion is longitudinal, so that the cutting point constantly moves from the handle to the other end of the blade, while you push from you, there is still improvement in the condition of the cut edge. But if the handle is much nearer to you than the blade, say at 45° with the fold of the paper which is to be cut, and the knife is drawn towards you, while it is also forced against the paper, you will make a smooth edge when you cut. One who shaves himself

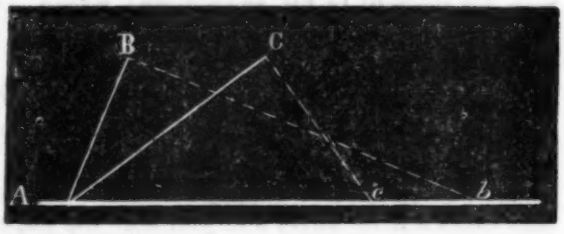
may experiment upon these modes of operation, and will scarcely doubt their importance.

In a plough, there is no opportunity for the sliding motion—that is, none has ever been devised. But regard is had to the position of the knife. It should not be perpendicular to the surface, but cut obliquely. It should also cut to the bottom of the furrow. The horizontal blade, or that which severs the bottom of the furrow-slice from the stratum below it, is governed, of course, by the same rules. There is, however, one point of difference. If the furrow-slice is to be turned unbroken and retain its place on the field, without lapping over the next furrow-slice in one place, and leaving a gap in another, it is desirable to leave a short space uncut, that it may act as a hinge on which the furrow-slice may turn with due regularity. This is not obviously to gain power, but rather at a slight loss of it, for the sake of another good.

The turning of the furrow-slice. If the width of the plough is too great in proportion to its length, making the wedge too blunt, the furrow will be broken into pieces and be laid irregularly. If the wedge is too long, the plough will not be so easily managed, and the furrow-slice will not probably be well laid. The furrow-slice should not leave the mould-board till it has been carefully turned considerably beyond a perpendicular, so that it may drop regularly into its place. If the plough is too short, the extreme pressure of the soil against the mould-board will drive the plough to the land-slide, and produce irregularities in the line of its direction and in the position of the slice.

The great question then comes up, What should be the shape of a plough-share in order to secure all these points? Some are concave through nearly their whole extent, thereby increasing friction unnecessarily; some are decidedly convex, breaking the furrow by lifting it too suddenly; some others are concave in one direction, and straight in another.

This seems to us the best form for general work, while each of the others may have their merits for some special service. The boldly convex will pulverize the soil most effectually, while it requires most strength of team. But as suggested in the beginning, no two states of the same soil are best suited by the same plough. General principles only can be inculcated.



If A B and A C are the mould-boards of two ploughs of the same width, the resistance which each encounters is in proportion to the perpendiculars B *b* and C *c*. Hence, the smaller the angle formed by the mould-board with the line of the furrow, the less will be the resistance.

But this is only one view of the subject. We regard the mould-board as a flat surface, in the above proportion, while in all ploughs, we have more or less of curved lines in this part of the implement. The amount of curve, its direction, and the shape of the board, are all questions of great practical importance. The effects of these different shapes, we propose to consider hereafter.

So also the form and length of the beam, or, in other words, the connection of the plough with the driving power, and the length, connection, and adaptation of the handles, are essential items in considering this question.

What ploughs, in fact, possess the requisite proportions in the greatest

degree, with the best line of draught, etc., is a separate branch of inquiry, which we have not the means to pursue. If any of the different manufacturers, or their friends, will furnish statements or descriptions illustrating this subject, we will cheerfully give them place.

A NEW AND GOOD MODE OF WIRE-FENCE.

The agriculturists of the United States have been looking long and anxiously for some better mode of fence than any now in vogue. Our forests are steadily retiring before the advancing wave of civilization; and *wood*, the most common material for fencing, is daily becoming more scarce and expensive. Many of our States have no *stone*, so that we can find little relief from the growing scarcity of wood in *wall-fences*. Nor can *hedges* or *live-fences* avail us; our soil, climate, and physical geography being inimical to them. One of the most eminent agricultural writers in the country recently stated, that in all his travels east, west, north, and south, he had found *but one good live farm fence;* "and that," said he, "was supported on one side by a board-fence, and on the other by a rail-fence."

So expensive, indeed, have all our present modes of fencing been found, that Burnap, a well-known agricultural writer, has demonstrated that "the fences of this country cost *more than twenty times* the amount of *all the specie* that is in it. In some States—for instance, Texas, where rough cypress boards are sold for seventy dollars per thousand feet—the expense of fencing a farm is two or three times greater than the first cost of the farm itself.

These long-established facts long since led many of our leading agricultural and mechanical journals, lecturers, writers, and associations, and especially the New-York Society of Agricultural Debates, to the conclusion that *iron* or *wire* would eventually be adopted as the staple material for fences. But the difficulty heretofore has been found in the want of a *machine* for the manufacture of wire or other iron into fencing. *That machine has now been invented*, patented, started, and the *netting* made by it successfully and extensively tried for fencing. The inventor was John Nesmith, Esq., of Lowell, Mass.; and the Lowell Wire-Fence Company are the manufacturers of this fencing, which they claim to be, and perhaps correctly, the cheapest, considering its strength, closeness, durability, and beauty, in the world. Thus has the great necessity of American agriculture been supplied, by an invention which will, without doubt, produce, at least in some sections of country, a considerable revolution in our system of fencing.

By different machines, constructed, however, on the same general principles, all kinds of this netting have been produced, adapted equally as a fence for cattle, sheep, pigs, fowls, roads, lawns, gardens, ornamental fences, vine-trelisses, *netting in lieu of bed-cords in bedsteads*, window-netting, bird-cages, hen-coops, etc. The netting is furnished in neat and portable rolls, at from seventy-five cents to two dollars per rod; some being varnished black with asphaltum varnish, some painted of whatever color, and some galvanized, in order to beautify and preserve it from rust; the width or height of this netting, the size of the wire of which it is composed, and the meshes or spaces between the wires, all vary to suit the tastes of purchasers. Some of the netting is two feet, some three feet, and some four feet in height.

The sizes of the wire are from No. 20 to No. 10; and the meshes are from one to six inches. Any farmer has skill enough to apply it to his own uses.

The fencing is fastened to posts, set from ten to fifteen feet apart, by nails, brads, or iron or wire-staples; the upper edge of the netting being kept on a level from one terminus to another; and no rails are necessary, though some farmers use a *top*-rail occasionally.

This fence is particularly adapted to those districts which are periodically subjected to *hurricanes* and *floods*, offering no resistance to wind or water. While other fences cover from one to four feet of the soil throughout their length, this occupies no space at all, and shuts out none of the genial rays of the sun. While other iron-fences are seriously injured by the alternate expansion and contraction, occasioned by the changes incident to the temperature of the atmosphere, this, by the novel and ingenious manner in which its wires are knit or woven together, is enabled to undergo these changes of temperature, and the expansion and contraction occasioned thereby, without the slightest deterioration or injury. It requires little and unfrequent repair, and is calculated to last a century or more. The farmer who has not a surplus of wood or stone on his farm, can find no fence so admirably adapted to his wants, by cheapness, strength, portability, durableness, beauty, and economy, as this. By an outlay of less than a dollar and a half per rod, with a little personal labor, and a few posts, he can erect a substantial farm-fence, impassable to cattle, sheep, or pigs, which will survive when he is no more, to his children and his children's children.

We propose, in a future article, to present suitable drawings of this remarkable mode of fence, with additional descriptions of the same. Meanwhile, we will be happy to answer inquiries, and can send printed specimens of the different patterns or styles, if so requested.

STRODE'S HYDRAULIC RAM.

Mr. Strode, of Philadelphia, has been engaged several years in the manufacture and erection of water-rams, in which he has made several valuable improvements, secured by various patents. He has received premiums at the Pennsylvania State Fair, 1854, and at the Franklin Institute, 1854.

His first improvement consists in laying the driving-pipe, which conveys the water from the head to the ram, in the brachysto-chrone curve, which is the curve in which a body will descend from one point to another point in the shortest time, and therefore with the greatest mean velocity. By this property of the above curve, a greater quantity of water can be raised by a machine of a given size, than can be raised with the driving-pipe laid in any other direction; and in consequence of the increased reäction of the water thus produced, the discharge-valve is opened with more rapidity and certainty. A second improvement consists in the carrying of a pipe from the upper valve-seat of the puppet-valve to the bottom of the air-chamber, for the purpose of transferring the shock produced by the rising of the puppet-valve to the air-chamber; and also in placing a series of short vertical tubes, extending from the upper valve-seat of the puppet-valve to the external air. By these improvements, the puppet-valves of hydraulic rams can be made

to slide in perfect contact with the top of the chamber, without producing a destructive shock on the metallic parts of the chamber, and without the puppet-valves sticking to the upper seat, by reason of a partial vacuum there. He has also made a further improvement in the arrangement of these valves, whereby as the puppet-valve rises, the water inclosed between the top of the puppet-valve and the valve-seat, is made to escape at the side of the puppet-valve down into the valve-chamber, by which arrangement the shock of the valve and its sticking are entirely obviated, without any additional tubes or complication of apparatus. By means of these improvements, he can construct rams which will be free from lability to derangement; and rams of the largest size can be constructed, which shall be equally durable, efficient, and simple in construction, as rams of the smallest size.

THE MUSQUIT TREE.

A TEXAS paper contains the following interesting account of the tree concerning which so much has been said as affording a gum which it is thought will prove an excellent substitute for gum arabic, and the getting of which it believed, will, ere long, prove a profitable employment for the Indians of the West:

"This is a very abundant timber in many portions of Western Texas, possessing some remarkable and valuable properties. It deserves attention. Although a very compact and heavy wood, and generally free from rot, yet the centre portion is generally shivered in circles often as near as two or three inches to the surface. It splits with remarkable accuracy through the centre, and, although a scrubby low growth, its great durability renders it valuable for posts and fencing material. A considerable amount of timber may be procured from it, and for furniture there is scarcely any wood superior to it. It takes a beautiful smooth polish, never shrinks, although put together green. The color is at first a bright brown, and with age assumes a deeper bright brown. Perhaps no wood yields greater heat than this when seasoned. The sap portion is very thin, often not more than one fourth of an inch thick. If the tree is hacked in the months of June or July, a gum issues in considerable quantities, and hardens from the action of the sun, having all the properties of gum arabic. The decayed wood by being burnt under cover yields a large amount of benzoic acid. The burning of this wood in stoves is very destructive to them; the grating and sides are rapidly corroded both by the heat of the grate and acid vapor of the burning fuel. To the soap-maker it furnishes a material of importance. The ashes, instead of containing potash, as most hard woods do, are carbonic acid and soda combined; and by putting say a peck—and half a bushel would do no damage—of fresh-burnt quick lime to the barrel of ashes, it will yield caustic soda-lye that will make the very best soap. Cattle are very fond of the ashes, as they lick them up whenever a tree is burnt upon the prairies. Another use, it is probable, could be made of the ashes; which is to scatter say half a bushel through each load of corn as it is housed, to destroy the weavil. It would certainly do no mischief, and would improve the shucks. As a fertilizer there is no doubt it would give valuable results upon worn-out soils; but it is not probable that the application will be made for many years, for the soil upon which the musquit grows is invariably fertile and of great depth. This tree belongs to the family of acacias."

INFLUENCE AND IMPROVEMENT OF THE SUB-SOIL.

The influence of the sub-soil is of great importance. It may entirely control the fertility or barrenness of a given tract. Hence its actual and relative conditions should be carefully studied, For example: Let us first suppose a sandy surface with a clay sub-soil. The hard clay is impervious to the rains, and the sand above it has but little power to retain them. Hence, if the surface-soil is shallow, and if the waters falling upon it are not retained by the natural formation of the surface around, in a dry season it must be dry and comparatively unproductive. But let this sub-soil be thoroughly broken up, and rendered so porous as to absorb the rains which fall upon it. Clay having the power to retain moisture in an eminent degree a reservoir is here provided for a season of drought, which may secure good crops, which would otherwise be a comparative failure. For this clay, being well furnished with moisture, as the surface becomes dry and hot, will gradually yield up this valuable deposit, in the form of water or of vapor, according to circumstances. If the season is wet, large quantities of rain falling upon it, which are not absorbed, will themselves dissolve the more soluble parts, and running off to waste, greatly impoverish the land. If the season is wet, a part at least of the excess of moisture is absorbed by the prepared sub-soil, and the surface is proportionally benefited.

If the land in question is inclosed on all sides by higher surfaces, so as to prevent the escape of the rains descending upon it, of course it will be cold and wet, and comparatively worthless. Under such circumstances, a thorough breaking up of the clay beneath would open a way of escape for the excess of water, the clay retaining a considerable portion of it, which would, as before, become available in time of need.

If both soil and sub-soil are porous, the tendency will be to render the whole too dry in ordinary seasons. Under such circumstances, deep ploughing is not desirable.

If the soil is clay for a considerable depth, including what is usually termed soil and sub-soil, shallow ploughing will only produce a cold and wet surface, unless there are ample facilities for draining. And if these latter conditions exist, then the soil may be well moistened by the rains, but it speedily becomes hard and dry, the roots can not penetrate into it, and the plant dwindles and is comparatively worthless. If this clay were thoroughly pulverized to a great depth, the excess of water would speedily disappear, and the soil might still remain in a favorable condition for the growth of plants.

A gravelly sub-soil exerts a similar and favorable effect on a clay soil. If the latter is well cultivated, the sub-soil, retaining a bountiful supply of water, though less than if it were clay, yields it up as it is required, and tends to secure a good growth on the surface.

A sandy sub-soil, being incapable of retaining any thing, acts as a leach in depriving the soil, not only of its moisture, but of every thing that may be held in solution, which as readily escapes to still lower depths, or is otherwise effectually cut off from contact with the roots of the crop. Hence, to benefit such soils, the first step must be to render not only the soil but the sub-soil retentive of moisture. To this end, lime, gypsum, charcoal, and other substances of the same character should be freely used, and thoroughly mixed with the soil to as great a depth as is practicable.

While this process is going on, it should also, as indeed in all cases, be remembered that one great point in all cultivation is to produce a soil of fine minute grains or particles. The particles of soils differ in this respect as essentially as do the fibres of wool in fineness, or of hair. As a frequent and continued application of the comb and brush will make the most stubborn head of hair to become soft and pliable, so will proper cultivation improve, in these respects, the character of our soils.

The ploughing in of green crops, or of vegetable matter but partially decomposed, tends very strongly to recover a soil that is too hard and dry. For a clay soil, compost, well mixed, in which sand is a predominant element, will also be found very useful. So horse-dung is an efficient application for such lands, not acting as a proper manure, so much as an *amendment*, its effect being physical rather than chemical.

THE "NE PLUS ULTRA" WHEAT.

For several seasons past, much interest has been excited in this neighborhood, in the result of experiments made by Mr. Harradine, of Needingworth, near St. Ives, Huntingdonshire, in the growth of a new description of wheat, and which, if "it giveth forth its increase" at the rate of multiplication that has attended it hitherto, bids fair to create a revolution in the agricultural world. One ear of it was sown in 1849, on the land of Mr. Harradine, and the produce of this again in 1850 and 1851, when it yielded at the extraordinary rate (especially for those years) of 19 combs, 1 bushel, and 1 peck per acre, ($77\frac{1}{4}$ bushels.) It has been sown on almost every available description of soil, and introduced in every imaginable change of crops. It was sown after Tartarian oats, clover, seeds, peas, and tares, on soil of various compositions, fen and highland; in all cases the quantity of seed was restricted to four pecks per acre; but the result was the same, the yield reaching that previously realized by Mr. Harradine. It has been sown after wheat, clover, barley, beans, oats, and fallow, and sustained its reputation through these trials: it has been sown in winter and in spring, drill, broadcast, and dibbled, with the same results, some put in in February showing no diminution in the yield. The preparation of the land may be the same as for ordinary wheat, and the same rate of increase in the yield over ordinary sorts may be expected.

[The above is from the *Cambridge* (Eng.) *Chronicle*, and if reliable, is certainly worth the attention of agriculturists.

METROPOLITAN MECHANICS' INSTITUTE.

The Second Exhibition of the Metropolitan Mechanics' Institute, for the promotion of Manufactures, Commerce, and the Mechanic and Useful Arts, will be opened in the city of Washington, on Thursday, February 8, 1855, in the new and splendid hall of the Smithsonian Institute. The rules adopted by the Committee are as follows:

RULES.

1st. The hall will be opened for the reception of goods on Monday, the 29th day of January; and on the evening of Thursday, the 8th of February,

at 7 o'clock, the exhibition will be formally opened for the reception of visitors, and continue open about four weeks.

2d. No article deposited after Saturday night, 3d of February, can be entered upon the Judges' lists for competition or premium, except such as the Committee shall be satisfied were dispatched from a distance in time to have reached the hall by that day, but failed to arrive from unavoidable detention.

3d. Articles designed *for exhibition only* will be received, *free of charge*, until *Tuesday night*, 6th of February, at 10 o'clock, after which time *depositors will be subject to a charge* of from 50 cents to $1, for each article deposited.

4th. Apprentices and minors who contribute articles of their own make or invention shall specify their age, and the time they may have served at their business.

5th. All articles deposited for competition and premium must be of American manufacture, conspicuously labeled with appropriate names; the name of the maker and inventor, if known, and the name of the depositor; a copy of which label must be furnished the Clerk at the time of bringing the goods for entry on the record. Prices may be affixed, or not, at the option of the exhibitor.

6th. Depositors, at the time of entry, will receive a ticket of title to their goods, which ticket will also admit them to the Exhibition at all times, when open to the public.

7th. This ticket or check shall only be used by the depositor, and when found in the hands of another person, will be stopped at the door, and the depositor deprived of its use.

8th. No article can be removed from the Exhibition until its close, without permission of the Committee.

9th. The Machinery Department will be under the care of a special Superintendent, and the Committee offer every facility of steam-power, fixtures, labor, etc., *free of expense*, hoping that this portion of the display will be unusually varied and attractive.

10th. The time of delivery of the Opening and Annual Addresses will be announced hereafter. The Closing Address will be delivered, and the Premiums announced on the closing day, by the President of the Institute.

11th. The Judges will be appointed about the time of the opening of the Exhibition, and the hours before 10 o'clock, each morning, *will be appropriated exclusively to them to examine the articles.* Before 10 o'clock, therefore, no *owner, agent, depositor, or visitor will be admitted to the hall,* unless the Judges require some explanation, in which case *all the competitors in the same class shall be duly notified to attend.*

12th. Where objections are raised, proof of origin may be required by the Judges or Committee on Awards.

13th. All articles will be at the risk of the owner or depositor, who is expected to be present during the hours of exhibition. In the intervening time, and at all times, the Committee will use every effort for their preservation.

14th. Proper order will at all times be preserved by an efficient police, who will be present to prevent offenses against contributors and visitors.

15th. Season tickets to the Exhibition will admit the owner and a lady or two children at all exhibition hours. A season ticket will make its holder a member of the Institute, and will be received, at the close of the Exhibition, in payment for his initiation fee and one year's subscription.

Members or junior members who transfer the use of their tickets, shall be deprived of the privileges of the Exhibition.

N. B.—Goods should be addressed as follows: "*Exhibition of the Metropolitan Mechanics' Institute, Washington City,*" and should have the nature of the articles, and the name of the party sending them, distinctly marked on the package. They should also be accompanied by a detailed invoice.

Any further information will be given by applying, post-paid, to the Superintendent, to whom all communications on the business of the Exhibition should be addressed. THOMAS C. CONNOLLY, *Superintendent.*

The following is the list of officers:

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AMERICAN POMOLOGICAL SOCIETY.

THIRD SESSION AND FIFTH MEETING. BOSTON, SEPT. 13, 14, 15, 1854.

By the courtesy of Hon. M. P. Wilder, the President, we have received a copy of the proceedings of this Society. It forms a pamphlet of 258 pages of 8vo size, and is executed in very handsome style, worthy of the Massachusetts Horticultural Society, by whom and at whose expense it was published. We gave in our last number a short extract from one or two of the addresses, as brought to our notice in some newspaper report, and we now give, as we purpose to do hereafter, further extracts.

Mr. Wilder, the President, in his admirable address, spoke as follows in relation to

THE PRODUCTION OF SEEDLINGS.

My next suggestion relates to *the production from seed of new varieties of fruits adapted to particular localities, or to general cultivation.*

The immense loss to American cultivators, from the importation of foreign varieties, in many instances not well adapted to the countries from which

* Those marked with an asterisk compose the Exhibition Committee.

they come, and often still less adapted to our soil and climate, suggests the importance of raising from seed, native sorts which, in most instances, possess peculiar advantages. It is now generally conceded that the trees and plants of a given country, like its aboriginal inhabitants, will flourish better at home than in most foreign localities.

We rejoice that public attention has been turned to this subject by some of our horticultural journalists, and that many cultivators and amateurs are engaged in this interesting and promising department. The success which has crowned their exertions affords great encouragement to perseverance. Witness, for instance, thirty or more varieties of the cherry, by Dr. Kirtland, of Ohio, which appear adapted to our eastern climate, and some of them of superior excellence. Witness the numerous varieties of the raspberry, by Dr. Brinckle, Ex-President of this Society, of which some have endured, without covering, the severities of the last winter in the New-England States, and which also promise to be valuable contributions to American pomology. In addition to these, how many new varieties of the apple, the pear, the plum, and the grape have recently been added to the list of American fruits! How many new and excellent varieties of the strawberry have appeared since the introduction of Mr. Hovey's Seedlings!

These are sure indications of the success which will reward future efforts to obtain valuable and native varieties of fruit; and they point to the fulfillment of the prediction of the celebrated Van Mons, "that the time will come when our best fruits will be derived from seedlings." He gives the following sage counsel to his correspondents to whom he had sent trees: "*Sow your seed and persevere without interruption, and you will obtain even better fruit than mine.*"

Among pioneers in this department I am happy to notice a gentleman (now residing among us) the pupil and friend of Van Mons, one who has adopted our country as his future home, and who has already transplanted to our soil many thousands choice seedlings of the pear, which have come into his possession from the collections of that gentleman and the celebrated Esperen.

As to the best method of producing fine varieties from seed, the opinions of distinguished pomologists are not uniform.

Duhamel, among the French, from causes which seem to us irreconcilable with nature and experience, entertained serious doubts of the practicability of any method for obtaining new and valuable varieties from seed, especially of the pear, because he had tried various experiments without success for fifty years.

Dr. Van Mons, of Belgium, instead of saving the seed of the *finest* varieties, selected those of inferior sorts, upon the principle that a kind having arrived at the highest state of perfection must deteriorate, while an inferior one would improve by successive reproductions. He also held that hybridization tended to degeneracy and imperfection. Thus he assumes the doctrine that a perfect variety necessarily deteriorates, and also overlooks the fact, observed by other distinguished men, that the improvement or deterioration of which he speaks may result from natural impregnation by the pollen of other varieties, conveyed by the air or insects, and therefore that the seed of a good variety may produce either a better or a worse, and that of a bad either a worse or a better.

Mr. Knight's system of obtaining new and improved varieties depended entirely on hybridization, or artificial impregnation, so lightly esteemed by Dr. Van Mons. This is somewhat difficult to practise, on account of natural

fertilization by insects and the wind; but it has the merit of depending on a truly philosophical principle, and with very particular attention may yet prove as available for the improvement of our fruits as it has for the production of fine varieties in the vegetable and floral kingdom, or as the corresponding principle has in the crossing of the breeds of domestic animals.

The results of Mr. Knight's experience disprove the tendency to degeneracy, inasmuch as many of his fruits, obtained by hybridization, are among the most durable and hardy varieties, as the Eyewood and Dunmore Pears; the Black Eagle, and other Cherries.

Many cultivators, as Esperen, Bivort, Berckmans, and others, both in this and foreign countries, have sown seeds in variety, and have obtained some valuable sorts. But I am confirmed in the opinion that the best means of producing new and excellent varieties, suited either to general cultivation or to particular localities, is to *plant the most mature and perfect seed, of the most hardy, vigorous, and valuable sorts;* on the general pathological principle that like produces like, and upon the conviction that immature seed, although the embryo may be sufficiently formed to vegetate, yet, not having all its elements in perfection, it will not produce a vigorous and healthy offspring. Dr. Lindley, commenting upon this practice, justly remarks: "All experience shows that in every kind of created thing, be it man, or beast, or bird, the mysterious principle called life remains during the whole period of existence what it was at first. If vitality is feeble in the beginning, so it remains. Weak parents produce weak children, and their children's children are weaker still, as imperial dynasties have sadly shown." With him, we believe this theory as applicable to the vegetable as to the animal kingdom. May not a disregard for this doctrine account for the great number of feeble, sickly, early-defoliated trees often found in our grounds by the side of those that are vigorous, healthful, and persistent in foliage? Is not the theory we advocate as important in the production of fruit-trees as in the raising of cereal grains? The skillful agriculturist saves the best seed of his various crops, and selects the best animals from his flocks and herds for breeders. Why should not this law of reproduction regulate the practice of the pomologist as well as of the farmer? Has the All-wise and Infinite enacted several laws where one would subserve the purpose?

To the doctrine of Van Mons, and other distinguished writers, respecting deterioration by age, and after a variety has reached its perfection, there seem to be some exceptions. From the accounts of Oriental travellers, may we not believe that the grapes of Eschol are as perfect now as when the chiefs of Israel plucked their rich clusters three thousand years ago; and that the same variety of the fig, the olive, and the pomegranate are as perfect in Syria to-day as in the period of David and Solomon? It is worthy of inquiry whether the native grapes on the banks of our rivers have deteriorated since the day when the red men of the forest refreshed themselves with the fruit from those vines, and whether the orange, the lemon, the bananna, and the fruits of southern latitudes, evince any more signs of decay than they did centuries ago; in a word, whether this doctrine of deterioration is as applicable to the *native* as to the foreign fruit of a country?

Why may we not expect to obtain natural varieties of the apple and other fruit as durable and far more valuable than those which have passed their second centennial, as the Endicott and Stuyvesant Pears? From meteorological, or other causes which we do not at present understand, particular varieties may deteriorate in a given locality for a season, and afterward revive; or they may show signs of decay in one locality, and flourish well

in others not very remote, as the White Doyenne, which has been considered, for many years, by some in this vicinity on the decline, while it is perfect in several places in Maine, New-Hampshire, Vermont, and other States. Fruit-bearing may exhaust the vital energy of the tree, and hasten decay, but still the variety may remain. We have among fruit-trees no example of longevity equal to that of the new Taxodium, found in California, supposed to be three thousand years old. Our object is not to controvert the opinions of those who believe in the running-out of varieties, whether their duration be limited to one hundred or one thousand years, but to enforce the importance of raising new varieties from seed, especially adapted to our own location.

At this meeting a Report was made by Dr. Harris, the eminent entomologist of "the Diseases and Insects affecting Fruit-trees and Vines." This we intend to publish as soon as we can obtain engravings of these insects, of a reliable character. We have already taken measures to secure them.

A large portion of the pamphlet before us is taken up with the discussion on the lists of fruits worthy of general cultivation, of those that promise well, and those that are rejected from the lists.

The following is the corrected list of

FRUITS WORTHY OF GENERAL CULTIVATION.

Apples.—American Summer Pearmain, Baldwin, Bullock's Pippin, Danver's Winter Sweet, Early Harvest, Early Strawberry, Fall Pippin, Fameuse, Gravenstein, Hubbardston Nonesuch, Lady Apple, Ladies' Sweet, Large Yellow Bough, Melon, Minister, Porter, Red Astrachan, Rhode-Island Greening, Roxbury Russet, Summer Rose, Swaar, Vandervere, White Seek-no-Further, William's Favorite, (except for light soils,) Wine Apple or Hays, Winesap.

Pears.—Ananas d'Eté, Andrews, Belle Lucrative or Fondante d'Automne, Beurré d'Anjou, Beurré d'Aremburg, Beurré Diel, Beurré Bosc, Bloodgood, Buffum, Dearborn's Seedling, Doyenné d'Eté, Flemish Beauty, Fulton, Golden Beurré of Bilboa, Lawrence, Louise Bonne de Jersey, Madeline, Manning's Elizabeth, Paradise d'Automne, Rostiezer, Seckel, Tyson, Urbaniste, Uvedale's St. Germain, (for baking,) Vicar of Winkfield, William's Bon Chrètien or Bartlett, Winter Nelis.

FOR CULTIVATION ON QUINCE STOCKS.

Pears.—Belle Lucrative, Beurré d'Amalis, Beurré d'Anjou, Beurré d'Aremberg, Beurré Diel, Catillac, Duchesse d'Angoulème, Easter Beurré, Figue d'Alençon, Glout Morçeau, Long Green of Cox, Louise Bonne de Jersey, Napoleon, Nouveau Poiteau, Rostiezer, Beurré Langelier, Soldat Laboreur, St. Michael Archange, Triomphe de Jododigne, Urbaniste, Uvedale's St. Germain or Belle Angevine, (for baking,) Vicar of Winkfield, White Doyenne.

Plums.—Bleecker's Gage, Coe's Golden Drop, Frost Gage, Green Gage, Jefferson, Lawrence's Favorite, McLaughlin, Purple Gage, Purple Favorite, Reine Claude de Bavay, Smith's Orleans, Washington.

Cherries.—Belle Magnifique, Black Eagle, Black Tartarian, Downer's Late, Downton, Elton, Early Richmond, (for cooking,) Graffion or Bigarreau, Knight's Early Black, May Duke.

Apricots.—Breda, Large Early, Moorpark.

Nectarines.—Downton, Early Violet, Elruge.

PEACHES.—Bergen's Yellow, Cooledge's Favorite, Crawford's Late, Early York, (*serrated*,) Early York, (large,) George IV., Grosse Mignonne, Morris White, Old Mixon Free.

GRAPES, (*under glass.*)—Black Hamburg, Black Frontignan, Black Prince, Chasselas de Fontainebleau, Grizzly Frontignan, White Frontignan, White Muscat of Alexandria. (*Open culture.*)—Catawba, Diana, Isabella.

RASPBERRIES.—Fastolf, Franconia, Knevet's Giant, Red Antwerp, Yellow Antwerp.

STRAWBERRIES.—Boston Pine, Hovey's Seedling, Large Early Scarlet.

CURRANTS.—Black Naples, May's Victoria, Red Dutch, White Dutch, White Grape.

GOOSEBERRIES.—Crown Bob, Early Sulphur, Green Gage, Green Walnut, Houghton's Seedling, Iron-Monger, Laurel, Red Champagne, Warrington, Woodward's White Smith.

BLACKBERRIES.—Lawson's New-Rochelle.

"THE LARGEST MILL IN THE WORLD."

PERHAPS we ought to have been more careful than to have extended the circulation of a mistake of the nature of that referred to below. Had we gone into any "calculation," we should have discovered the error. But finding it with a responsible indorser, and that it was an item of general interest, we used the scissors at once, scarcely reading it through, and thought no more about it. We thank our correspondent for his favor, which we insert below, and should like to receive statistical or other information from him at all seasons. Though it comes anonymously—so that we owe no body for it—the handwriting is quite familiar to us.—EDS. P., L., & A.

FOR THE PLOUGH, THE LOOM, AND THE ANVIL.

MESSRS. EDITORS: On page 369, No. 6, of your useful periodical, you have copied from the *Lowell Courier*, and as your journal goes broadcast over the land, you have given extensive publicity to a very considerable blunder. You say that at the "Pacific Mills," in Lawrence, *the largest in the world*, (not yet, they may be one of these days,) Mr. Clapp, the paymaster, pays out to the operatives, 2000 in number, $500,000 for wages *every month*. Now, $500,000 per month are equal to $6,000,000 per annum, and $6,000,000 per annum, divided among 2000 operatives, give $3000 per annum to each. Only think of that—each Yankee boy and girl, and each Irish boy and girl—of these "*largest mills in the world*" earning $3000 a piece per annum. Come hither, ye poor desolate men and women of all trades, and grades, and professions; come, ye pulpitless ministers, ye briefless lawyers, ye patientless doctors, ye starving needle-women, needless is it for you to go any longer without money and without price; hasten to the "largest mills in the world," and sell your services at the glorious price of "$3000 a piece per annum." And here it may be asked, if the operatives get that, what does the treasurer get, what the agent, what the book-keepers,

and paymaster? Why, they must pile it up so thick, that the stockholders will run the chance of getting precious thin pickings.

The fact is, your friend of the *Lowell Courier* put on just one cipher too much to his $500,000 per month. It should have read $50,000, and would not be right then, for their monthly pay-roll has never yet exceeded $35,000. Perhaps it will be $50,000 as soon as they get to be "the largest mill in the world." At $50,000, the average pay per annum of the operatives would drop down to $300, and out of this they must pay their board.

Again, it is stated, as something remarkable, that Mr. Clapp appropriates "to each the exact amount she has earned." Of course he does, and so does every paymaster in every mill in the whole world. He would neither pay more or less. Is there any thing wonderful in paying a person just what he or she earns? There are time-tables, and clerks, and pay-rolls in all mills, and this monthly exact payment is the commonest thing in the world.

The Pacific Mills are very fine and very large, and are spending a good deal of money. The time for the first dividend is not yet fixed by the Directors, but it may come off in due season.

As to their being the largest in the world *now*, it is not true, since the Atlantic Cotton Mills are 70 feet longer in the main mill, and the Bay State Mills undoubtedly cover more space. It is expected that the Pacific Mills, *when finished*, will be the largest in the world. At present the main mill is but 500 feet long; they are intended to be, one of these fine days, 800 feet long.

Yours truly,

Lawrence, Dec. 16, 1854. OLD MILLWRIGHT.

MISCELLANEOUS.

ENLARGING VEGETABLES.—Upon an average, only one half the size is attained for all vegetables grown which might easily be had by an improved mode of culture. If every thing was doubled in size, without saying any thing about the increase otherwise in the amount of crops, what a vast gain it would be to the farmer. Every body is struck with the improved value given to grain, as well as roots and esculents, by increased size. Then why don't every body try to increase their own? Take, for example, the common garden pea, and try the following experiment:

Plant it in very rich ground; allow it to bear the first year say half-a-dozen pods only; save the largest the following year, and retain of the produce three pods only; sow the largest the following year, and retain one pod; again select the largest, and the next year the sort will have trebled its size and weight. Ever afterward sow the largest seed, and by these means you will get peas, or any thing else, of a bulk of which we at present have no conception.

Select wheat in the same way, and after three years you will be astonished at the result.

REMEDY FOR THE BLACK-KNOT.—A correspondent of the *Cultivator* says that he has never found any thing that will compare in efficacy for preventing black excrescences on the plum-tree to a strong solution of chloride of lime, applied to the wounds made by their removal. He has tried this remedy for two years, and in no instance has it failed to prevent the fungus from bursting out again from the wound. A trial was made this year on about

fifty young trees, from a portion of which the knots were cut off early in summer, and no application made to the wound; to a second portion strong lime was applied, and to a third chloride of lime. In numerous instances the excrescence burst out again in the first two cases; in the latter none. Salt has been strongly recommended, but the superiority of the chloride was very decided.

Weights of Grain, etc.—We are indebted to our friend Col. Buckner for the following weights, regulated by the laws of Kentucky, of grain, etc., per bushel: Wheat, 60 pounds; corn, shelled, 56 pounds; rye, 56 pounds; potatoes, 60 pounds; beans, 60 pounds; clover seed, 60 pounds; oats, 33⅓ pounds; corn-meal, 50 pounds; bran, 20 pounds; barley, 48 pounds; onions, 57 pounds; buckwheat, 52 pounds; salt, 50 pounds; flax seed, 56 pounds; hemp seed, 44 pounds; timothy seed, 45 pounds. The above is taken from the revised statute laws of Kentucky.

Apples for Market.—We see it stated that Mr. James Upton, of Monroe county, N.Y., has shipped twenty thousand barrels of apples to New-York, by canal, this season, and has now several boats loading with the same fruit. He purchases apples at all points accessible to the canal. The crop this year is an excellent one, better than those of several previous years, and the demand for the fruit abroad makes it a profitable one.

New-England Enterprise.—We have often alluded to the prosperity of the towns and villages of these States. We find the following statement in reference to the industry of one of these small communities. The whole township, by the last census, has a population of only 1776 inhabitants.

Warren.—Among the many towns which furnish the Boston market with the necessaries of life, Warren holds a prominent rank. The people are intelligent, enterprising, and active. The farms are well adapted to grazing, and are almost exclusively devoted to that purpose. Since the first of May last, there have been sent from Warren to Boston 218,604 pounds of cheese, and 589,994 gallons of milk; and during the month of November, the same city received 73,128 pounds of pork from Warren and vicinity. Efforts are making to secure a course of lectures during the winter, and, though late, it is hoped the endeavors will succeed. The Warren Cotton Mills Co. are completing a large brick factory over one hundred feet long, and four stories high.

Granaries for the Storing of Corn.—The Messrs. Huart, the great millers of Cambrai, have patented a peculiar kind of granary which they have in use for the storing of their corn. In this arrangement the corn fills completely the space in which it is to be preserved, and is kept in constant motion by means of a steam-engine. The grain is lifted up and stirred round by means of a helix, and from thence falls upon an apparatus where, by means of a fan, the chaff, dust, and other foreign substances are removed, and the insects and their larvæ destroyed. The corn is then carried back to the same inclosed space again, and the operation from time to time repeated. These granaries are considered to be adapted not only for the preservation of corn in good condition, but for that which is already damaged.—*Le Genie Industriel, France.*

Winter Feed of Breeding Ewes.—Until two or three weeks preceding lambing, it is only necessary that breeding ewes, like other store sheep, be kept in good plump ordinary condition. Nor are any separate arrangements necessary for them, after that period, in a climate where they obtain succu-

lent food to provide for proper secretion of milk. In backward seasons in the north, where the grass does not start prior to the lambing time, careful flock-masters feed their ewes with chopped roots, or roots mixed with oat or pea-meal. This, in my judgment, is excellent economy. For the effect of the various esculents on the quantity and quality of the milk, see Liebig's Animal Chemistry.—*Sheep Husbandry.*

Railroads in Ohio.—This enterprising State contains 2181 miles of railroad completed, and 1576 miles in progress. It is said that of these, 300 miles will be completed in 1855. There are four great trunks across the State from north to south, and four from east to west. These eight lines pass through forty county seats.

Management of Fairs.—We have on our table a communication from our old friend and contributor, Durant, whom we welcome back again to our pages, on the Management of Fairs, called forth by views which we have recently given on that subject; but it came too late for this number. We shall give it a place in our next. We mention this fact, contrary to our general usage, because we wish to keep the subject on the minds of our readers, and again to invite further discussion. We are just beginning, in our opinion, to take correct observation of our true place on this subject, and it is second in importance to very few.

Composition of Eggs.—The investigation has been made of late by several distinguished anatomists, and a part of the results is given in the present number of the *American Journal of Arts and Sciences.* From this we gather the following facts:

An examination of the eggs of numerous animals proves that these bodies are as varied as the animals which they produce. They differ in the elements present, in their organisms, and in their structure. Some of them do not harden by exposure in boiling water. In the eggs of some birds, the white is almost fluid; in others, it is gelatinous. The color of the white of a hen's egg, after boiling, is pure, opaque, white, and solid. That of the lapwing, after cooking, becomes transparent, opaline, greenish, and so hard that it may be cut into little stones, used in some parts of Germany for common jewelry. The chemical constitution of the eggs of various birds differs very materially.

Turning to the eggs of fishes, it is found that the new-laid egg of the ray is covered with a shell of a bronzed-green, whose tissue is made up of short, felty fibres; its general form is rectangular, more or less elongated and curved on both sides. The internal organism is also peculiar, and among other differences it is found that the yellow is not separated from the white by any membrane. The white also differs from the white of a bird's egg in its chemical properties.

The eggs of a bounce shark are rectangular, much longer but much narrower than those of the ray. Its shell is hard, resisting, yellowish, horny. The vitellus or yolk occupies the greater part of it, and the white is more viscous than that of the ray.

These and other differences are pointed out, somewhat extensively, in the treatise before us, but the subject is not one of sufficient general interest to warrant us in occupying much space with these details.

A New Species of Silk-Worm.—Experiments have been made in France to acclimate the *Bombyx cynthia*, a silk-worm of India, which, according to Roxburgh, furnishes a silk so firm that clothes made of it will last a life-time. These experiments, thus far, are very favorable.

C., C. & C., AND C. & E. CAR-SHOPS, UNDER THE SUPERINTENDENCE OF N. H. MARCH.—Last Friday we visited the large car-shop under the superintendence of N. H. March, on the Lake Shore Road, and spent an hour or more in examining it.

The building is a large one. It is some two hundred and ten feet long and about sixty wide. Near by is Geo. W. Sizer's foundry. There are employed in the car-shop, or connected with it, 117 men, (a large majority of whom are married,) and 20 in the foundry.

These buildings are devoted to the construction of cars of every description, and the repairing of them.

The lower room in the "large brick" of the shop is taken up with the iron and wood work, and adjoining is a complete blacksmith's establishment. We noticed all the improved machinery for manufacturing cars. The whole was driven by an engine of sixty-horse power. The upper room is devoted to cabinet-work, finishing, upholstering, etc., etc.; and connected with the main building is a large paint-shop under the charge of Charles Reipleir, a master in ornamental painting. In this department all are Germans. Opposite is a lumber-yard, and a large building for storing lumber.

We found on the track, just turned out, six new cars and a baggage-car, by all odds the most perfect we have seen. They are ten inches wider, giving three inches more on each seat and four inches in the aisle. Their bodies are thrown on to steel and India-rubber springs, which it is believed, will make them easier every way. The trucks are far stouter than heretofore. One improvement we were glad to notice. The breaks are very much improved, both in power and in speed of application—for, as arranged in these cars, one man may break upon two sets of cars. In the baggage-car we observed also another improvement. The doors were constructed to fold round into a recess so as to prevent accident to the men inside, or to lessen the chances of injury to them in case of accident.—*Cleveland Weekly Leader.*

SHIP-BUILDING. — The *Boston Journal* published recently a detailed account of the ship-building in Boston and its vicinity during the year 1854. The *Journal of Commerce*, on Tuesday, published a similar account of ship-building in New-York and vicinity. From these statistics it appears, that for the first time, the amount of tonnage built in the District of Boston, during the year 1854, was greater than in the District of New-York. But in both districts the business is now nearly at a stand-still, though it has been unusually large. In New-York, it is said that not more than 1000 hands are now employed in the ship-yards, against 3500 or 4000 employed in prosperous seasons. And that though the year has been one of unusual activity in the ship-yards, it has yet been an unfortunate one to builders, owing to the advance in building materials and labor; and several builders of long standing and acknowledged ability have been compelled to succumb to the pressure of the times, and stop business. In New-York, there have been launched during the year 88 vessels of all descriptions, representing 80,130 tons, (of which 26 were full rigged ships, and 4 were steamships,) which have cost, at the estimate of $65 a ton, not less than $5,200,000. While the number of ships built this year exceeds the number in 1853 by eight, the number of steamships built this year is six less than it was last year. About 70 steamships in all have been built in New-York, mostly of large size, at an estimated cost of about $14,000,000.

In Boston and vicinity, during the year, there have been built 57 vessels, of which 45 were ships, 8 were barques, 3 were steamers of from 150 to 350

tons, and 1 was a schooner. The aggregate tonnage of these vessels was 68,282, and the estimated cost of the whole, at $65 a ton, was $4,483,430.

Rutland County Marble and Slate.—At the late Agricultural Meeting at Rutland, Vt., Charles Sheldon, Esq., of West-Rutland, said that in 1850, there was quarried at West-Rutland, $190,000 worth of marble; in 1853, $360,000 worth; in 1854, probably $400,000 worth. From other towns in the county, he thought that $200,000 worth of marble would be exported this year. The value of the marble sold is twice as great as the wool clip of the county in 1850. It exceeds the value of the wool and dairy products of the county. At the West-Rutland quarry, there are consumed annually 150 tons of hay, 6000 bushels of potatoes, 6 tons of butter, and 6000 bushels of corn. Of the value of the marble exported, three fourths is added to the wealth of the county.

The demand has always exceeded the supply. There is no fear of a decrease of the demand. To increase the supply, more capital should be invested in quarrying and sawing marble. Rutland can furnish, annually, marble to the amount of $1,500,000. He said that the quality of the slate in this county was equal to that of any part of the world. It was inexhaustible in quantity, and the demand for it was far greater than the supply. He thought that, this year, not less than $300,000 worth of slate would be quarried in Rutland county.

Tennessee Copper.—The *Knoxville Register* states that recent discoveries afford proof of the existence of one continuous vein of rich copper ore between the Polk-county mine in East-Tennessee, and the mine recently discovered in Carroll county, Virginia. In the Tennessee vein, the miners have reached the yellow sulphuret of copper, which is considered an infallible indication of the great extent and richness of the mines in which it abounds. The discovery of this metal has infused a new impetus into mining operations, and several weeks since there were sales of three quarter sections of mining land, at about $1,250,000. The *Register* states that some five thousand tons of rich copper ore are taken from the mines monthly, netting at least half a million of dollars. The amount will doubtless be increased when the shafts which are being sunk penetrate the rich sulphuret.

Moral of the Baby Show.—We, at our cattle shows, give prizes to the man who produces the best food for the people's eating. The Americans give prizes for the mouths best adapted to eat the food which is so bountifully prepared for them on their vast continent. The two nations typify their differences in this manner. Our great desire is to find ample food for our population. The Americans are only desirous of a large population to consume their food.—*London Times.*

Productions of Algeria.—This colony promises to take a prominent rank among countries which derive their principal wealth from the production of silk. The success of the cochineal insect at Algiers is no longer doubtful. The madder of Algiers is more highly esteemed than that of Cyprus. The cotton of that colony took eleven prizes at the London Exhibition. The olive-tree grows there to the height of our largest forest-trees. Certain countries are covered with it. Species of cork-oak constitute a large part of the forests. There are also forests of cedar, pine, juniper, arbor vitæ, black walnut, etc. These statements are contained in an official report to the French government.

The Fall-River Route.—This Company still retain their unrivalled reputation. Their new boat will be ready with the return of the next seasont and will be in advance of any thing yet seen in our waters. The workmen are busily engaged in finishing the interior apartments, which will so unie, elegance and comfort as to satisfy the most extravagant demands of the traveller. We have recently been shown over every part of it, and must say that we have never seen any steamboat that was so completely furnished with every thing that comfort, luxury, or taste could conceive. The following details show not only her mammoth size but thorough provision for all supposable necessities:

Her length is 345 feet, (or more than $\frac{1}{15}$ of a mile.)
Beam, 47 feet.
Width from guard to guard, 80 feet 11 inches.
Hold, depth, 16 feet 11 inches.
Tons measurement, 2300.
Height of ceiling in cabin, 11 feet 6 inches.
Steering-wheel, 7 feet diameter, 3 rims.
Water-wheels, 43 " " 14 feet length of buckets.

She has 108 inches cylinder.

She has 95 state-rooms, of which 18 have each four berths, etc., and 18 of them have berths of extra width. There are also 400 open berths, furnishing comfortable accommodations for 750 persons.

She is also provided, on a level with the upper saloon, with an apartment for ladies, in which they may arrange their toilets, etc. Water-closets are provided on both decks. Her name is The Metropolis, and she will be commanded by Captain Brown, now of the 'Bay State.'

Building Stones: Brown or Red Sandstone.—We have not forgotten our promise to give our readers some information on this subject, in continuation of what we have written of marble and granite. We shall probably do so in the next number.

Origin of Nitrogen.—M. Boussingault has published the details of other experiments upon the vegetation of several plants, confirming his views as recently presented in this journal. He also promises another memoir on the same subject.

Lightning Conductors.—Mr. Nasmyth has described, before the British Association, an improved arrangement for a lightning conductor for chimneys. Instead of fixing it outside by metal hold-fasts, he would suspend it in the middle of the chimney by branching supports fixed on the top. "An experience of eighteen years has tested the superiority of the plan." In the discussion, Professor Faraday recommended that the lightning conductors should be placed inside instead of outside of all buildings. He considered the shape of the conductor, whether flat or round, as immaterial.

Preservation of Meat.—Carbonic acid is very efficient in retarding putrefaction. Beef in contact with carbonic oxide for the space of three weeks was found perfectly fresh, and of a fine red color.

Gas Coal.—The coal near Preston, Va., is found to be of great value for the production of gas, superior to any other coal in this country. It lies adjacent to the Ohio & Baltimore Railroad. So says the *Cumberland Journal.*

NEW ENGLISH PATENTS.

APPLICATION OF GLUTEN TO BREAD AND OTHER ARTICLES OF FOOD.

J. H. Johnson, 47 Lincoln's Inn Fields, and Glasgow.—This British patent has been taken out on behalf of M. Durand of Toulouse, who has occupied himself for several years back with experiments as to the best modes of treating gluten so as to obtain a palatable bread from it. Gluten is obtainable from various vegetables, being their essential nutritive component; but it is to that obtained from wheat that M. Durand's improvements more particularly refer. The invention consists, in the first place, in preparing gluten bread by baking it in moulds fitted with loose lids which rest upon the gluten, and rise with the gluten as it expands by the action of the heat. The bread formed from gluten possesses great nutritive quality, and will keep for a long period of time without injury. This substance may be employed in various proportions with farinaceous substances of all kinds, and is also found advantageous in the manufacture of chocolate and vermicelli. In making gluten-chocolate, a small quantity of muriatic acid may be added. In baking gluten-bread, the inventor employs moulds of a square section and slightly conical, that is to say, slightly contracted at the base, in order to facilitate the removal of the bread after it is baked. When the paste is introduced into the mould, it is covered with a movable lid, which rests upon it, in order that its development may be progressive. The weight of this lid should be proportioned to the degree of purity of the gluten. Two rods of iron fitted at each extremity serve to prevent the lid or cover from falling off, and to limit the rising of the paste; this being most essential, as the heat having a great influence over the gluten, the rising or development of this matter would become too great, and deteriorate the bread if not forcibly restrained. For the same reason, the baking should be accomplished in a moderately-heated oven, and for the preparation of wheat-gluten no leaven need be employed. The kneading ought to be effected by manual labor, and as actively as possible. To proceed with that operation it is necessary to choose a favorable moment, which will be known by the degree of moisture of the substance, this moisture always agreeing with the amount of flour to be mixed with the gluten. Bread thus made presents the appearance of bread well worked; it is exceedingly light, and of an agreeable flavor. It is rather elastic when it is first made, but hardens in a few hours. It may be heated after being cut into slices when required for consumption; it then becomes more brittle, and is more easily masticated. It may be also kept for a long period without any deterioration whatever. The following are the proportions which are employed in the mixture of gluten with other alimentary substances, and from which the best results have been obtained:

1. Bread composed of pure wheat-gluten, with the addition of one per cent of salt.
2. Bread composed of ninety per cent of moist gluten, ten per cent of wheat-flour, and one per cent of salt.
3. Bread composed of eighty per cent of moist gluten, twenty per cent of wheat-flour, and one per cent of salt.
4. Bread composed of seventy per cent of moist gluten, thirty per cent of corn-flour, and one per cent of salt.
5. Bread composed of sixty per cent of moist gluten, forty per cent of corn-flour, and one per cent of salt.

6. The same kinds of bread, with the addition of three per cent, five per cent, eight per cent, or ten per cent of fresh butter.

For chocolate, the following proportions are employed:

1. Gluten-chocolate made in the ordinary manner, and composed of about two parts of cocoa, and one part of gluten-bread reduced to an impalpable powder.

2. Gluten chocolate made in the same manner, and composed of two parts of cocoa, two parts of sugar, and one part of gluten-bread reduced to a fine powder.

3. Four parts of cocoa, five parts of sugar, and one part of pulverized gluten-bread.

4. Gluten-chocolate composed of two parts of cocoa, two parts of sugar, and one part of pure gluten-flour, also reduced to an impalpable powder. Each of the parts composing this chocolate should be well and carefully triturated and operated upon separately.

5. Gluten-chocolate, in which the fresh gluten is rendered less adhesive by the addition of one half of its weight in water with 0·002 of pure muriatic acid, and dried at a stove, the proportions being two parts of cocoa, two parts of sugar, and one part of moist gluten. The chocolate may be also prepared without any admixture with the acid.

Vermicelli may be prepared by means of any of the various breads already described. To manufacture it dry bread is used, and it is only after it has been submitted to the action of heat that it can be pulverized.

For gluten-bread made of Indian-corn flour, the same treatment must be adopted as for gluten-bread from wheat, with the addition of a leaven composed of two thirds of wheat-flour and one third of pure water.

Manufacture of Caoutchouc. J. H. Johnson, London and Glasgow. —This French invention, which has been patented in England on behalf of MM. Guibal & Cumenge, relates to the recovery and utilization of the volatile ingredients used in dissolving caoutchouc in the process of manufacturing it, instead of allowing these ingredients to be lost by evaporation. This great saving is effected by placing the soft caoutchouc upon traversing cloths in closed chambers, provided at the top with a means of condensing the vapors, and carrying off the products, the material being heated by suitable apparatus beneath the traversing cloth. The caoutchouc, as it leaves the spreading rollers, is traversed over a horizontal table, consisting of upper and lower cast-iron plates, with an intervening place for the introduction of steam, hot water, or heated air. This table is covered in by a roofing of metal plates, set at convenient angles, the chamber being closed in at each end by triangular metal plates, placed vertically. The roof is covered with felt, which is kept constantly saturated with cold water, supplied by a duct above, and which is again collected by gutters running along the lower edges of the roof-plates. The vapor rising from the material is condensed upon the under sides of the roof-plates, and, trickling down, is collected in suitable gutters; these gutters being carried completely round the chamber, and across the end-plates, so as to prevent any of the products of condensation from falling upon the caoutchouc beneath. The gutters communicate with suitable receptacles, into which the condensed matter passes; and this matter can be used over again repeatedly in the manufacture of the caoutchuc, thereby considerably reducing the cost.

Journal Bearings. A. Barclay, Kilmarnock.—With a view of economizing the oil used in lubricating the journal bearings of horizontal shafts,

by enabling it to be repeatedly reüsed, Mr. Barclay has designed the improvements forming the subject of the present patent, and which, by preventing the too rapid escape of the lubricating oil from between the rubbing surfaces, also renders the lubrication of the shaft much more efficient. In carrying out this invention, according to one modification, the shaft is formed with a projecting collar upon it, of the length of the intended bearing, and the brasses are formed to suit this modification. Each brass extends considerably past each edge of the collar, and is slightly turned out or recessed, so that the angles of the collar shall be slightly overlapped by the brass. Beyond this overlap on each side, the extension of the brass is hollowed out internally, to form an annular cup for the reception of oil, and these edge-cup pieces are well overhung, and brought close to the plain part of the shaft to prevent the entry of dirt. The inner face of the upper brass is inclined upwards from each side towards the centre, instead of being square across as usual; and the result is, that the oil supplied from the top, in the usual way, is well spread over the frictional surfaces, and, flowing down, it is caught by the annular cups of the brasses, and retained therein for continued use; or the same effect may be obtained by beveling the inner edge or edges of the inner brass alone, the upper brass being made square across, as usual. The continued use of the oil is effected by the action of the bearing collar on the shaft, for, as this revolves, its edges gather films of oil from the annular cups, and bring up the oil so collected to the top brass. Here the revolving collar edges apply the oil to the corresponding edges of the upper brass, and, owing to the duplex interior incline thereon, the oil is thence conveyed towards the centre of the bearing, whence it is well distributed over the whole rubbing surfaces. Instead of a plain collar projection, other forms of journals may be employed with the same result, or a couple of rings may be set fast on the shaft, so as to carry up the oil in a similar manner.

New Mordant in Dyeing.—A Swede named Rydin, has published a method of obtaining a fine blue, of excellent tint, for cotton, by employing as a mordant the oxide of chromium, dissolved in an acid; in place of this oxide, a double salt may be used, such as the double sulphate of chromium and potash. This salt is obtained by mixing one part of a solution of bichromate of potash, and one part and a half, or two parts, of sulphuric acid. Alcohol, sugar, or any other substance capable of converting the chronic acid into an oxide of chromium, may be added. The oxide is added to a decoction of logwood, and the dyeing may be effected in one operation, by putting together the salt, the decoction, and the cotton, and heating the whole. Or the cotton can be treated with the salt, hot or cold, and may then be placed in the decoction until the desired color is obtained. By varying the proportions of the salt to the decoction, very delicate shades of gray and lilac may be obtained.

Dock Railway, Liverpool.—At the last meeting of the British Association, there was exhibited a large model of a high level railway, which it is proposed to carry along the east side of the whole line of docks at Liverpool. The construction will consist of iron frame-work supporting two platforms. The lower will be about 52 feet wide and 20 feet above the present quays, designed entirely for goods traffic, having four lines of railway—the two nearest the docks to be used as sidings for trucks while loading and unloading, and the other two as up and down lines for trucks in motion. The upper platform is to be about 23 feet wide, and to have two lines of railway, intended for passengers only. The lower platform will be provided with

hydraulic cranes, which will transfer goods either from or to the vessels or the trucks, as well as work through the hatchways in the platform to the quays. The scheme embraces the construction of deposit and transit-sheds, a connection with existing or future railways, and with private warehouses, and the erection of passenger-stations. The great thoroughfares will be crossed by bridges, and the line will be equally applicable for horses or locomotive power. The cost is estimated at less than £250,000 a mile. This includes hydraulic cranes and platforms, with stationary steam power to work them. On the other hand, it is calculated that the value of the quay space gained by the platforms of the railway, at the low rate of £5 a yard, will yield a return of about £210,000 a mile, not much below the estimated expenditure.

Effect of Light upon the Compass.—Attention was called, by Sir John Ross, at Liverpool, to the omission of any notice in the Admiralty Manual of Scientific Inquiry, of the effect which light exerted upon the magnetic needle. The Swedish philosopher, Wrede, totally excluded light from his magnetic observatory, with the exception of a subdued light at a considerable elevation vertical to the horizontal needle, while the arc was read off by a telescope, at a distance of several yards from the instrument. Means, with the same end in view, ought to be adopted in every magnetic observatory; otherwise, no reliance could be placed on the observations. It was evident that the more deliberately the magnetic needle was suspended, the more obnoxious it would be to the effect of artificial light in the operation of reading off the instrument. In proof of the effect of every description of light on the magnet, Sir John mentioned that, during his last voyage in the *Felix*, when frozen in about 100 miles north of the magnetic pole, he concentrated the rays of the full moon on the magnetic needle, when he found it was five degrees attracted by it.

Twin-Dredger of Thirty Horse Power. By J. W. Hoby & Co., Engineers, Renfrew.—This powerful dredging machine was constructed for the Commissioners of Leith Harbor, the designs furnished by the makers being approved of by Mr. Rendel, the engineer. It has been a very successful machine, its performances being at the rate of 1840 tons discharged per day of ten hours. A deviation from the ordinary system of construction was adopted in it, on account of certain peculiarities of the locality for which the dredger was destined.

The hull is of plate-iron, and is ninety feet long, thirty feet wide, and eight feet six inches deep. A large well is formed in the centre of the vessel for the passage of the two endless chains of buckets, and for the introduction of the ladders upon which the buckets are supported. These ladders are upheld at one end by the main shafts, by means of which the buckets are driven, the other extremities of the ladders being slung to a hoisting apparatus at the other end of the vessel, so that they may be elevated or lowered to suit the level of the bottom to be deepened. The machinery is driven by a pair of oscillating cylinders, each twenty-five inches in diameter, and placed immediately below the main driving shaft, which is at the upper end of the bucket-ladders. These cylinders are supplied with steam from two boilers near the longitudinal centre of the vessel, and placed one on each side of the central well. The motion is first communicated to a transverse horizontal shaft immediately over the steam-cylinders. This shaft carries two very heavy fly-wheels, and has bevel-pinions upon its overhanging ends, and connected to it by frictional couplings, so as to yield to any inordinate strain.

These bevel-pinions gear with bevel-wheels keyed upon vertical shafts, which carry bevel-pinions upon their upper ends in gear with large bevel-wheels on the main driving-shafts. The bevel-pinions on the upper ends of the vertical shafts can be engaged with, or disengaged from, their shafts by means of adjustable clutch-boxes. Connections are likewise provided to enable the engines to drive the several winches for lifting the lower ends of the bucket-ladders, for warping the vessel into a new position, and for other purposes.

The sand or mud raised by the buckets is discharged into a shoot or duct of plate-iron, which conveys it into the pontoon-hopper, or lighter, placed across the end of the vessel to receive it.

Patent Hydrostatic Cranes. By J. Robertson, Engineer, Ardrossan.—These hydrostatic machines will be found useful in the operations of the civil engineer, and in engineering work-shops, in all cases in which heavy bodies have to be lifted or moved, and particularly where, from the nature of the ground or the position of the object to be lifted, it is difficult to apply ordinary winch or crane power. One of these cranes can be attached as easily as the ordinary block-tackle, whilst it has the advantage of being worked so as to exert its full power directly in the line of the centres of attachment, the machine simply acting as a contracting connecting link in the lifting-chain with no lateral strain whatever, such as is occasioned by the drawing end of the rope in block-tackles.

In common with all machines of this class, great power is obtained in a very small compass, and the working of it can be easily changed to suit the load, a quick speed being employed for a light body, and a slow speed with great power for a heavy one.

The essential feature of the apparatus is the use of a working cylinder, of the pendulous kind, fitted with a piston to be actuated by water pressure. For example, in a warehouse or work-shop, the working-cylinder may be slung or suspended, in an inverted position, from any convenient over-head beam, by a rope, link, or joint attached at its closed end. In this way the piston-rod works through a stuffing-box at the lower end of the cylinder, and the projecting end of the rod carries a hook, or other connection, for attachment to the actual hauling-chain. The actuating fluid is conveyed into the cylinder by a flexible pipe, so that the vibration of the cylinder can not affect the pressure flow. By attaching a suitable valve to the working-cylinder, the pressure fluid may be directed to either side of the piston, so that the upper end of the cylinder answers as a convenient reservoir for the fluid. The fluid pressure may be obtained from various sources, as from natural head-columns, or from pumping apparatus; and in using pumps, these details may be either at a distance from, or attached to, the side of the working-cylinder. Where long strokes or lifts are required, this may either be effected by suitable pulley or lever arrangements in connection with the working piston-rod, or by the adoption of a telescopic arrangement of the working-cylinder, one cylinder being placed inside the other, the traversing-cylinder inside the external one being formed to work as a piston; this internal cylinder again having a piston within it, so that a long stroke is obtainable from this duplex action; and, instead of using one cylinder only as the lifting movement, two or more may be suspended side by side. Travelling cranes may also be constructed on this principle, the working-cylinder in such case being disposed horizontally upon the cross-beam of the crane-framing, and being immediately supported by a traversing carriage, so that the lifting apparatus can be run back or forward at will, to suit the requirements of the time, whilst

the travelling frame itself further adds to this power of removal; such a carriage may also have upon it the actuating pump. In such hoisting apparatus, the stop-valve of the lifting-cylinder, by holding the fluid-column, acts as a certain holder of any weight which may be upon the crane. Such cranes are made to indicate the weight upon them, by attaching to the main working-cylinder a smaller cylinder bored to two slightly different diameters. A single piston-rod has upon it two pistons, one for each of these two diameters, and the working fluid from the main cylinder has access to the space included between these two pistons. The difference in the area of the pistons being extremely slight, the larger piston is caused to traverse, in proportion to its greater area, against the resistance of a spring fastened to the piston-rod. This rod carries an index bearing upon a graduated scale, and the suspended weight is thus at once pointed out.

Mining Engines and Machinery. A Barclay, Kilmarnock. *Patent dated March* 2, 1854.—A portion of the improvements comprehended in this patent relate to the so arranging the winding engines of coal and other mines, that they may be more safely managed than at present, whilst all chance of "over-winding" and injury to the mining mechanism may be avoided. These improvements are effected by adapting the ordinary and well-known "link motion" to the hand-gear of the engine, so that the attendant can easily stop and reverse his engine at the exact moment required in the action of winding. To do this, the engine-man has only to work a hand-lever up or down; and this lever being suitably connected with the "link-motion," correspondingly affects the portion of such motion, and thereby either stops or reverses the engine, as is at present done in locomotive and marine engines. By such a system of gearing, the motion is entirely unbroken, and the attendant has always a safe and perfect command over his engine; and to add still further to the safe working of the system, a self-acting movement is contrived to come into play at the precise moment required, for the purpose of stopping or reversing the engine, in case the engine-man should be careless or absent at the proper time. For this purpose a tumbler is so connnected with the engine or winding mechanism, that it shall be slowly wound up, or elevated to its falling centre, at the time that the motion of the engine is to be changed. Thus, as this tumbler falls over, it acts through suitable connections upon the reversing or stopping-link, and effects the intended movement. Various means may be adopted for securing the self-acting effect, disengaging pins or stops being so set as to actuate the link-movement at the proper time.

As adapted to direct-acting horizontal cylinder winding and pumping engines, for instance a small shaft passes away back from the main-shaft to the steam-cylinder, at which end this small shaft carries a worm in gear with a worm-wheel set on a horizontal stud. This wheel has a ring-groove in its side to receive adjustable stud-pins, which are set at the proper distances in the wheel, so as to act upon the adjusting lever of the valve-link motion. Provision is also made, by a separate adjusting slide or bolt, for allowing the engine-man to set the engine to go constantly in one direction, as when used for pumping. When so set the adjustable-pins of the worm wheel no longer affect the engine, so as to set the valves for back or forward actions, or the up and down winding. Should the engine accidently run slightly beyond the intended point, an eccentric piece on the stud-spindle carrying the worm-wheel acts upon a sliding piece carried round by the wheel, and this movement, acting upon the under side of the valve-link lever, sets this lever to its

central position, so as to prevent the return of the engine. These gearing details are obviously capable of being modified in various ways, and the arrangements are suitable for beam or other kinds of engines. To prevent accidents from the main gearing getting disengaged, a friction-brake apparatus is provided, to stop the engine's movement. Thus, should the wheels fly out of gear—owing, for instance, to the attendant's leaving out the fastening-key when changing from pumping to winding—this friction-strap will be brought into play to prevent the engine from running away. The brake-pulley is set upon the shaft, which is liable to slip back, and being loosely encircled by a friction-strap, the lateral traverse, owing to the disengagement, makes the pulley press itself hard against the interior of the strap. This strap encircles three fourths of the wheel, and is workable as well from both its ends. These two opposite ends are each connected to one of the two opposite cages, that is, the ascending and descending cages. For instance, when one of the cages arrives at its proper stopping point, it acts upon a pin or stop in connection with one end of the friction-strap, and draws the strap tight around the pulley in the direction of the revolution of the pulley at the time being. Hence, whichever way the engine is running, the friction-strap has a tendency to be forced down into frictional contact by the pully movement when once started. The engine-man can also work such friction-brake by a separate hand or foot-gear movement.

Lappet Loom. J. Smith, Glasgow. *Patent dated February* 21, 1854. —This invention relates to the manufacture of goods of the "lappet" class, a portion of the improvements being in substitution of the ordinary pattern ratchet-wheel, whilst the usual "whip" rolls are superseded by another branch of the invention. Instead of the pattern-wheel, a small cylinder or barrel is used, carrying an endless chain, composed of small slips of wood, gutta percha, or other material capable of being shaped to the required form of link, and hard enough to withstand the working action. Or, instead of this contrivance, a framework, or combination of plates, or slips of iron, wood, or other material, may be used, such pieces being acted upon by a cylinder with perforated cards, so as to produce the required pattern, by acting upon the usual figuring mechanism of the loom. This movement is on the principle of the jacquard. In the endless chain arrangement, the links of the chain are formed and arranged to suit the intended pattern to be woven. The pattern, or figure, is engraved or formed, either in *intaglio* or in *relievo*, upon the external face of the chain, as many lines of pattern, or figure, being used as there are needle-frames. These pattern-lines extend continuously over the chain, and a pike, or catch, from each needle-slide, is connected with, or enters into, each of such pattern-lines. The endless chain is made to traverse to suit the loom action, and the needle-frames, governing the figuring movements, are thus made to traverse for the figuring action. In addition to this movement, the endless chain carries a secondary figure actuating a set of cranked pieces, which communicate with the lines of needles, so as to throw in or out such sets of needles as the pattern may require.

In dispensing with the "whip" rolls, the cops, or bobbins of whip material, are applied directly to the loom. This whip-yarn is used, either twisted, or in its natural untwined condition, and as many ends or lines of yarn are passed up in combination from the cops, as may be necessary for the production of the required figuring-thread. These lines of yarn, in passing from the cops, are kept at a regular even tension, by being passed between fric-

tional spring-holders, or elastic clips, so as to dispense with any other mechanism, the yarn being guided uniformly to the fabric as the weaving goes on. The improved processes considerably extend the capabilities of the lappet loom, affording a greater horizontal range for the needle-rods, so that an increased number may be used with convenience. Thus a greater width, or greater complexity of design, is easily attainable, whilst any length is secured by adding to the chain or to the perforated cards.

Steam Boiler Apparatus. J. Houston, Glasgow.—These improvements consist in regulating the supply of steam-boilers by the aid of a float, acting by means of suitable connections, passing through the boiler-case upon the stop-cock of the water-supply pipe. In marine boilers, this float is made to work in a chamber or casing communicating with the main boiler space by a small aperture, so that any motion of the mass of the water in the boiler may only affect the float very slightly. Another branch of the improvements relate to the adjustment of the flue-damper of a steam-boiler furnace, by means of a piston acted upon by the steam pressure, and arranged to open or shut a water-supply cock in connection with the damper movement.

Musical.—Grisi and Mario, New-York Philadelphia, and Boston. Those who have not heard these renowned artists, know not what they have lost. Mario, as a tenor, certainly has no superior, among all whose fame has reached us, and no equal has appeared in this community. But Grisi stands far above competition. As a vocalist, she has few equals; as a tragic actress, she has at least no superior. Certainly, the union of so great power in these two departments, gives her a prominent place among the most eminent artists in the history of the stage. She honors her profession—never descends to clap-trap and trick. She has fewer ornaments than many of our own vocalists, and therein she proves her greatness. Like Sontag, she dares to sing a simple melody as it is written. Every time she is listened to in tragic opera, she gains in her power over you. We shall never probably be favored with such an opportunity again. As we write this, these artists are announced as soon to appear in Philadelphia and in Boston. We charge every one of our readers who can appreciate the music of the opera, in the very highest style the world has known, to take the earliest opportunity to hear them.

The Orange Water-Melon.—Mr. Peabody, editor of the *Soil of the South*, Columbus, Ga., has lately introduced a new kind of water-melon, and which, from its singular properties, he calls the orange water-melon. By cutting the rind, as you peel an orange, the entire skin may be taken off, leaving the pulp unbroken, which, with a little care, may be divided as you would an orange. The flavor is said to be very fine, and it has proved itself perfectly hardy in this State. Mr. P. will, on receipt of a dollar, forward pre-paid packages of the seed.

General Agency.—The publisher of *The Plough, the Loom, and the Anvil*, believing it in his power to be of essential service to the readers of that journal, in the purchase or sale of various articles, and the transaction of various kinds of business, would announce to them that he is ready to execute any such commission which he may receive, including the purchase of books of any description; implements connected with agricultural, manufacturing, or mechanical operations; artificial manures; farm and garden seeds, etc., etc. One of the gentlemen connected with the journal is a proficient in music, and experienced in the selection of piano-fortes, flutes, etc., and will execute orders in that department.

He will also act as agent in the purchase and sale of Real Estate.

☞Particular attention to business connected with the Patent-Office.

Letters of inquiry on these matters will be promptly attended to.

School-Teachers. — Having had occasion to furnish teachers for some of our Southern friends, we have been fortunate enough to learn of several young ladies who are admirably well qualified for families or schools, and if any are in need of such, a letter addressed to us will receive immediate answer. We shall not fear to guarantee that any reasonable expectations will be fully met. Some of them are desirous of going South.

NEW BOOKS.

Literary Recreations and Miscellanies. By John G. Whittier. Boston: Ticknor & Fields. 1854. 431 pages.

Mr. Whittier's numerous friends will be highly gratified with this collection of prose and poetry, by this gifted author. Most of the pieces have already appeared in various journals, but being selected from a large number of his writings, published at different and distant times, they may be regarded as possessing, in the writer's view, peculiar merits compared with others that were passed by, and as especially illustrative of his peculiar but highly cultivated mind. The volume is handsomely executed, and does honor to the enterprising publishers.

Memorable Women, the Story of their Lives. By Mrs. Newton Crossland. With eight illustrations by Birket Foster. Boston: Ticknor & Fields. 1854. 355 pages.

This book will be read with great interest. It describes women, several of whom were very prominent in their day, and whose characters and social position secure for them universal regard. Among them are Lady Rachel Russell, Mrs. Thrale, Fanny Burney, etc. Their biographies introduce us to the most learned and most celebrated circles of those times, and give an insight into the private life and manners of some of the most cultivated minds in England.

Home Stories.

John P. Jewett & Co., Boston, have recently published a series of four small volumes, for children, written by Phœbe Harris Phelps, which are handsomely printed and neatly bound, as follows:

Henry Day Learning to Obey Bible Commands.
Henry Day's Story-Book.
Mary Day Forming Good Habits.
Mary Day's Story-Book.

These stories are well-written and short, and each inculcates very clearly some important moral or religious truth. The plan is excellent, and is very well executed. With juvenile libraries consisting of books like these, and the little work below, in all our schools, we might anticipate no small improvement in the conduct of our children.

Rose and Lillie Stanhope; or, the Power of Conscience. By M. J. McIntosh. New-York: D. Appleton & Co. 1854.

This little book is a gem. Not a line of it needs mending; not a paragraph could be spared. The story is well devised for illustrating the necessity of conscience, and its tremendous power, when properly enlightened, over the conduct of children. Parents and teachers might read this story with great profit. No juvenile or Sabbath-school library should be without it.

Sabbath Morning Readings in the Old Testament. By Rev. John Cumming, D.D., F.R.S.E., Minister of the Scottish National Church, Crown-Court, Covent Garden, London. Book of Genesis and book of Exodus. Boston: John P. Jewett & Co. 1854. pp. 385 and 371.

These volumes contain the substance of the exposition of the Scripture lesson of the morning service, to his own people. His object is not so much learned criticism as the solution of difficulties, and to impress the truth of the passage on the heart and mind and conscience. We need not say that the plan is ably carried out. In fact, these volumes are exactly what the intelligent reader of the Bible needs, and the want of which has been seriously felt. It is not a dry, doctrinal skeleton, but living Scripture truth, ably set forth, and will secure the attention of every intelligent reader. For sale by Jewett, Proctor & Worthington, Cleveland, Ohio; and Sheldon, Lamport, & Blakeman, New-York.

Amabel; a Family History. By Mary Elizabeth Wormley. New-York: Bunce & Brother.

This is a remarkable book. In every part of it, the story excites the deepest sympathies of the reader. The character of Amabel is drawn with great skill, and is well sustained from beginning to end. The plot is quite complicate, but the progress of events seems perfectly natural, and the story has an air of truth and reality quite unusual in this kind of literature. Some of the scenes exhibit great power, especially near the close of the book. The account of the storm and wreck it would be difficult to match from any female writer. The story is rather a sad one; but there are generally palliating circumstances, or, at least, there is a bright light in the distant future, relieving the darkness of the past. The final scenes are very adroitly conceived, and equally surprise and delight the reader.

We may certainly be proud of some of our female writers.

Investigation of the Alleged Official Misconduct of the Late Superintendent of the Philadelphia, Wilmington & Baltimore Railroad Co. Vol. I. Phonographically reported by Arthur Cannon. Philadelphia. 1854.

This ponderous volume of more than a thousand octavo pages, besides seventy-two pages of appendix, contains the evidence adduced by both parties to this controversy, before a committee appointed by the Board of Directors of this Company to make such investigation. At the close of the text, we find, "The testimony being concluded, the Committee went into private session." When they report their proceedings, probably the second volume will be issued.

Transactions of the New-York State Agricultural Society; with an Abstract of the Proceedings of the County Agricultural Societies. Vol. XIII., 1853. Albany. 1854. 783 pages, 8vo.

We tender our thanks to Mr. Johnson, the Cor. Secretary of this Society, for this valuable book. We shall avail ourselves of its highly useful information in our future numbers.

The Biography of Self-Taught Men; with an Introductory Essay. Boston: Perkins & Whipple. 1850 and 1852.

Two small volumes have been published at different times. One volume was prepared almost entirely by that accomplished scholar, the late B. B. Edwards. In this, twenty-seven distinguished characters are given, and eighteen in the second volume. We need not say that they are well written, nor that they are worthy of notice. We commend them to general attention, and especially to young men, for whom these examples are peculiarly profitable. Fine likenesses of Nath'l Bowditch and of Roger Sherman form the frontispiece. The successors of these publishers are the firm of S. K. Whipple & Co., 100 Washington street.

ROMANISM IN AMERICA. By Rev. RUFUS W. CLARK. Boston: S. K. Whipple & Co. 1855. 271 pages.

THE title describes the character of this volume. The origin and progress of Romanism, its principles, etc., as contrasted with Protestantism, are described in Mr. Clark's pleasing style. It discusses also, at length, the propriety of the claims of this denomination in reference to school-books and kindred matters. So far as we have examined it, it is free from the use of opprobrious language, and shows a candid, kindly spirit. These subjects deserve investigation, and indeed demand not only consideration, but decisive action.

THE SCIENCE AND ART OF ELOCUTION AND ORATORY; containing Specimens of the Eloquence of the Pulpit, the Bar, the Stage, the Legislative Hall, and the Battle-Field. By WORTHY PUTNAM, Professor of the Science of Elocution, and Practical Instructor in the Art. Auburn and Buffalo: Miller, Orton & Mulligan.

THIS is a good selection from the best of authors, from Mrs. Sigourney to Daniel Webster. It is in three parts. Part 1st, theoretic and scientific, contains rules and principles, illustrating the organs of speech, the elementary sounds of the language, inflections, attitudes, etc., occupying about fifty pages. The 2d part is rhetorical, classical, and poetical, one hundred and fifty pages; and the 3d part, comical and musical, another hundred pages. The volume is well printed and bound in cloth. For sale by Appleton & Co.

THE COMPLETE MANUAL FOR THE CULTIVATION OF THE STRAWBERRY: with a Description of the Best Varieties. Also, Notices of the Raspberry, Blackberry, Currant, Gooseberry, and Grape, with directions for their cultivation and the selection of the best varieties. By R. G. PARDEE. With a valuable Appendix containing the observations and experience of the most successful cultivators of these fruits in our country. New-York: C. M. Saxton. 1854. 144 pages.

THIS long title tells its own story. It is the result of actual experiments, long and carefully tried both in Northern and Southern climates, and deserves the attention not only of the amateur, but of the professional gardener. Price, 50 cents.

PRACTICAL MECHANICS' JOURNAL. Glasgow.

THE recent numbers of this journal have been received, and they commend themselves to the attention of all mechanics. The chapters devoted to American patents are full and scientific. Stringer & Townsend, Agents.

HARPER'S GAZETTEER OF THE WORLD.

WE have already commended the earlier numbers of this able work to the attention of our readers. The first six have been laid on our table. They are admirably executed. The matter is well digested. The statistics are so condensed as to comprise much information in a small compass. Ten numbers are to complete the set. Price, 50 cents each number.

RUTH HALL; a Domestic Tale of the Present Time. By FANNY FERN. New-York: Mason Brothers. 400 pages.

THIS volume is peculiarly a family story. The heroine, her parents and brother, her husband and his parents are the chief characters. They are skillfully drawn, and some of them are decidedly *rich*. But the book is peculiar. The author appears to have seated herself to this tale, with the single view of exhibiting every one of these relatives in the most odious light possible, while the heroine is lauded to the skies. Unlike other writers of fiction, who are content to allow actions to speak for themselves, she interrupts her narrative to introduce accumulative testimony to the meanness and cold-heartedness of these persons. She acts the part of a state's attorney in a criminal court, who endeavors to array all the witnesses he can find, to make out his prisoner as bad as he can. This peculiarity and certain well-known resemblances have led some to suppose that Fanny is the heroine of her own story. Nothing but personal antipathies, it is supposed, and not without reason, would lead one, in ordinary cases, to conceive such a plot, or to dishonor so holy relations, or to bring into ridicule religious professions, as does the conception which brought into being this story. We think she has erred also in her excessive commendations of the heroine, who, if a rational woman, must revolt at such gross flatteries. No friend was ever guilty of such fulsome stuff. But it may be that the whole is a work of fancy. If so, she certainly has a peculiar taste, peculiar ideas of filial affection, or, at least, peculiar modes of showing and inculcating it, as well as a

peculiarly unchristianized, not to say uncivilized, style of imagination. But in this age of morbid appetite for family scandal, whether real or imaginary, however they may affect her reputation as a woman, these very peculiarities will cause her book to be read, and will increase not only her own, but also the profits of the publishers.

LADIES' GUIDE OR SKILLFUL HOUSEWIFE; or Complete Guide to Domestic Cookery, Taste, Comfort, and Economy; embracing 650 receipts. By Mrs. L. G. ABELL. Thirty-Fifth Thousand. 1855. C. M. Saxton, New-York.

THIS little work contains almost every thing connected with the duties of a housekeeper, including directions for preparing meats, breads, cakes, puddings, pies, etc., for curing the diseases and dressing the wounds to which families are particularly exposed, and many other things that every body ought to know. All for 25 cents. Send for it.

ANNUAL ILLUSTRATED REGISTER. C. M. Saxton.

A VERY pretty annual, well worth the 25 cents at which it is sold.

AMONG the many elegant and valuable Books for Holiday Gifts, published by Messrs. R. Carter & Brothers, 285 Broadway, may be found the following:

THE AUTO-BIOGRAPHY AND REMINISCENCES OF THE REV. WILLIAM JAY. 2 vols., 12mo, $2.50. In 1 vol., full gilt, $3; half-calf, $3; full calf, $4.50.

"Few names are so extensively known in the Christian communities of Great Britain and the United States as that of William Jay. His Morning and Evening Exercises is in the great majority of Christian families. The Auto-biography is written in a style of great simplicity and pleasantness. The reminiscences, by Mr. Jay, of prominent individuals with whom he was well acquainted—as John Newton, Richard Cecil, Robert Hall, William Wilberforce, and others, are graphic and entertaining, and replete with anecdote."

EVENING HOURS WITH MY CHILDREN; or, Conversations on the Gospel Story. Illustrated with twelve large Illustrations, (quarto size,) colored and plain.

KITTO'S DAILY BIBLE ILLUSTRATIONS. 8 vols., 12mo. Cloth, $8; in half-calf, $12.

"The design of the writer is to seize upon passages of Scripture that are obscure, or difficult to be understood, particularly from their allusions to ancient places or customs, or persons or things, and throw upon them the light of history. Beginning in the first volume, with the Antediluvians and Patriarchs, the reader is led on, day by day, through the historic records of Moses and the Judges, Saul and David, Solomon and the Kings, Job and the poetical writers, Isaiah and the Prophets, and thence to the New-Testament characters and times, everywhere gathering new facts, and discovering the breadth and beauty of new truths."

SCOTIA'S BARDS; comprising the choicest productions of Scottish Poets, illustrated with more than fifty elegant engravings in the highest style of the art, with Frontispiece and Vignette by Ritchie. 8vo. Cloth, $3; full gilt, $4; Turkey Morocco, $6.50.

"SCOTLAND, rich in the treasures of Theology, History, and Philosophy, here stands before us with her long array of Poets, such as any country might be proud to acknowledge as its own."

PALEY'S EVIDENCES OF CHRISTIANITY. With Notes and Additions by CHARLES MURRAY NAIRNE, M.A.

THIS is one of the best popular treatises upon the external evidences of Christian Faith.

THE LAND OF THE FORUM AND THE VATICAN; or, Thoughts and Sketches during an Eastern Pilgrimage. By NEWMAN HALL, B.A.

THIS is a truthful record of the author's impressions and opinions formed by a careful study of scenes and places that he visited, and in his best style of composition.

FRITZ HAROLD; or, The Temptation. By SARAH A. MYERS.

JEANIE MORRISON; or, the Discipline of Life. By the Author of "The Pastor's Family.'

WORDS TO WIN SOULS. Twelve Sermons preached in 1620 and 1650. By Eminent Divines of the Church of England. Revised and abridged by the Rev. THOMAS S. MELLINGTON.

THE MILLINERS' AND DRESS-MAKERS' GUIDE.

THIS work is issued on the first of every other month, at $3 per annum, by Samuel T. Taylor, 407 Broadway. Mr. Taylor enables the subscriber to cut and make dresses from diagrams sent with the work. It is richly embellished with four large colored fashion plates in each number, obtained directly from Paris. The Maryland Institute and the Crystal Palace have awarded Mr. Taylor Prize Medals for the excellency of his system of cutting, as taught in the Guide. We commend the Guide to all housekeepers and others having families, as one of the most useful and practical publications of the day.

PETERSON'S LADIES' NATIONAL MAGAZINE.

MRS. STEPHENS, the editress of this popular monthly, is a lady of great talent, and the writer of several very valuable books, which are eagerly sought for by the reading public. Her magazine, which is produced with much taste, is filled with choice reading, at a reduced rate of subscription, only $2 per annum. Should the reader desire other literary works of a popular character, he will find a supply rarely surpassed in richness and variety, at Peterson's, 102 Chestnut street, Philadelphia, the publication office of the Ladies' National.

ARTHUR'S HOME MAGAZINE.

THE idea conceived by Mr. Arthur a few years ago, of imposing the reading matter of his Gazette in the form of a monthly, seems to have taken well with the public. This magazine is among our most popular periodicals, and we take pleasure in commending it to our readers. It is richly embellished, and furnished at $2 a year.

THE LIFE OF HORACE GREELEY, Editor of the New-York Tribune. By J. PARTON. New-York: Mason Brothers. 1855. 442 pages.

THERE are many things in the framework of this book which we should regard as of doubtful expediency, and there are opinions defended, incidentally, for which we have no sympathy. But, on the whole, the plan adopted gives a more thorough view of the man than any other. It is not a eulogy, but a plain narrative. The history of Mr. Greeley necessarily includes a history of the daily press in this city, and throws much light on the history of political parties during a period of many years. Much of the volume would be very entertaining to all parties, and no one can read the whole without the conviction that, however erroneous his views may be regarded, he is at least honest, thoroughly honest; and a life more persevering, untiring, and unyielding, even in the face of formidable obstacles, without the aid of friends or patronage, is seldom the subject of any biography. A true friend of the working classes, which is, in fact, synonymous with being the friend of the whole community, he certainly is; and if his advice is not always the best, we but have in this fact, the evidence that he is not infallible. His boyhood and youth may be a useful example to others in that period of life, and is a severe commentary on the utter failure of thousands who have utterly failed with vastly greater facilities for winning the prize.

GODEY'S LADY'S BOOK.

THE January number of this journal, received in advance of its date, furnishes abundant evidence of the determination of the publisher to deserve the reputation which he has already secured, and the extensive patronage he has long received. His illustrations are abundant. Terms, $3 a year.

THE LAND OF THE SARACENS; or, Pictures of Palestine, Asia Minor, Sicily, and Spain. By BAYARD TAYLOR. New-York: G. P. Putnam & Co. 1855.

MR. TAYLOR'S extensive travels in the most remarkable countries on the globe furnish him an inexhaustible supply of material for interesting narrative. This volume is the second portion of a series of travels, of which the "Journey to Central Africa," already noticed, is the first part. No portion of his travel is more fruitful of interesting topics than this. A few titles of his chapters furnish proof of this. For example: 2. The Coast of Palestine; 3. From Jaffa to Jerusalem; 4. The Dead Sea and the River Jordan; 9. Pictures of Damascus; 10. The Visions of Hasheesh; 31. The Eruption of Mount Etna, etc., etc. We need not say Mr. T.'s peculiar gift in description especially qualifies him for such work, and guarantees fresh interest even where numerous travellers have preceded him.

MR. RUTHERFORD'S CHILDREN. 2d vol. New-York: G. P. Putnam. 1855.

THIS volume is intended for "Ellen Montgomery's Book-Shelf," and is by the author of "The Wide, Wide World," "Dollars and Cents," etc. The first volume was published some years ago. It is very handsomely printed, and is done up in very neat binding, for a gift-book. The contents are sprightly and entertaining.

THE SHAKSPEREAN ORACLE. Edited by JOHN CRUGER MILLS. New-York: Bunce & Brother. 1855.

THIS is a very neatly executed little volume of 147 pages, more especially designed for young ladies and young gentlemen. Thirteen questions, of *very interesting nature*, in certain conditions of things, are each answered by a reference to any chosen one of fifty answers, all gathered from Shakspeare.

List of Patents Issued

FROM NOV. 14 TO DEC. 5.

Edwin Allen, of South-Windham, Ct., improvement in machinery for carving stone.

Levi B. Ball, Putnam, Ohio, improvement in smut-machines.

Wm. Brancroft, of Whiteford, Ohio, improvement in cultivators.

Henry Bates, New-London, improvement in slide-valves for the exhaust steam.

William Beebe, New-York, improvement in double cylinder boilers for hot-water apparatus.

Martin Bell, of Sabbath Rest, and Edward B. Isett, of Cold Spring Forge, Tyrone city, Pa., improvement in furnaces for making iron direct from the ore.

Wm. Bell, Boston, improved lamp-caps.

Job Brown, Lawn Ridge, Ill., improvement in cultivators.

Thos. M. Chapman, Oldtown, Me., improved device for adjusting mill-saws.

Matthias P. Coons, Brooklyn, multigrade iron fence.

Horace J. Crandall, East-Boston, improved method of adjusting vessels upon the keel-blocks of dry sectional or railway dock.

George Crampton, Worcester, improvement in looms for weaving figured fabrics.

Daniel Harris, Boston, assignor to John P. Bowker, Jr., of same place, improvement in sewing machines.

Jonathan Hibbs, Tullytown, Pa., improvement in ploughs.

Geo. Hodgkinson, Cincinnati, improved pegging-machines.

George T. Leach, Boston, improvement in the method of engaging and disengaging self-acting car-brakes.

Fras. Maton, New-York, improvement in breach loading fire-arm.

Wm. Morris, Philadelphia, improvement in omnibus registers.

Joseph Miller, Olean, N. Y., improvement in railroad car coupling.

Wm. Moore, Belleville, Ohio, improvement in grain-winnowers.

Alpheus Myers, Logansport, for tape-worm trap.

Alpheus Myers, Logansport, for tape-worm operation.

C. B. Normand, Havre, France, mode of controlling and guiding logs in saw-mills, without a carriage. Patented in England, 27th Oct., 1852. Patented in France, Nov. 5, 1852.

C. B. Normand, Havre, France, for improved method of hanging saws for mills.

C. B. Normand, Havre, France, for improved method of controlling the log for curved and bevel sawing. Patented in France, Nov. 5, 1852; English patent, Oct. 27, 1852.

Julius A. Peas, New-York, improvement in India-rubber over-shoes.

Charles A. Robbins, Iowa City, improved excavator and ditching plough.

Geo. D. Stillson, Rochester, improved excavating machine.

Wm. Stoddard, Lowell, for shingle-machine.

Jacob Swartz, Buffalo, improvement in grain and grass harvesters.

Benj. James Tarman, Philadelphia, improvement in machinery for stretching and drying cloth.

Orson Westgate, Riceville, Pa., for saw-gauge.

Leon Jarosson, Jersey City, improved method of constructing printing blocks.

George Bruce, New-York, improvement in casting types.

John A. Robling, Trenton, N. J., improvement in steam-boilers.

Michael Shimer, Union Township, Pa., improvement in railroad car-brakes.

James E. Simpson, East-Boston, for improvement in dry docks.

Thomas J. Sloan, New-York, improvement in casting metal window-sashes.

David G. Smith, Carbondale, improvement in running gear of railroad cars.

Mathew Stewart, Philadelphia, improvement in the manufacture of brushes.

Amasa Stone, Philadelphia county, for method of extinguishing fire in accessible places.

Thomas T. Tasker, Philadelphia, for mode of regulating the furnace of hot water apparatus.

James Taylor, Newark, N. J., improvement in covering cotton thread with wool.

Wm. D. Titus, Brooklyn, for improvement in lanterns.

Ellis Webb, Parkersville, Pa., for hydraulic ram.

Elbridge Webber, Gardiner, Me., improvement in churns.

Cyrenus Wheeler, Jr., Poplar Ridge, N. J., improvement in grain and grass harvesters.

Franklin Darracott, Boston, assignor to Geo. Darracot, same place, improvements in dry gas meters.

John Pepper, Jr., Portsmouth, N. H., assignor to the Franklin Mills, Franklin, N. H., improvement in knitting-machines.

Joshua Register, Baltimore, assignor to Elias Clampitt and Joshua Register, of same place, improved lubricating apparatus.

John W. Cochran, New-York, improved quartz-crusher. Patented in England, Nov. 21, 1853.

George Thompson and Merrell A. Furbush, of

Worcester, improvement in rollers for pattern chairs for looms.

Jonathan W. Caldwell, Rochester, improved arrangement of lever and catch for tow-lines of canal boats.

Jno. Absterdam, Boston, Mass., improvement in lubricating the cylinders of steam-engines.

Clark Alvord, Syracuse, N. Y., for hand brick-moulds.

H. F. Baker, Centreville, Ind., improvement in papering walls.

H. F. David, Ipava, Ill., improvement in saucepans.

Chas. G. Everitt, Brooklyn, N. Y., improvement in machines for closing sheet-metal boxes.

Jas. Freeland, Allegheny, Pa., improvement in valve gear for locomotive engines.

Samuel Greene, Woonsocket, R. I., cleaning cards of carding-engines.

Adoniram Kendall, Cleveland, Ohio, improvements in shingle-machine.

Jerome B. King, New-York, kettle for calcining plaster of Paris.

G. W. Lee, Ercildown, Pa., improvement in seed-planters.

D. B. Martin, Washington, N. J., improvement in packing slide-valves in steam-engines.

R. I. Nelson, Ocala, Florida, improvement in attaching life-preservers to vests.

Mighill Nutting, Portland, Me., for arrangement of pencils for drawing-machine.

Chas. Parham, Philadelphia, Pa., improvement in sewing-machines.

Wm. Perry, Graniteville, S. C., improvement in spinning-frames.

J. A. Roebling, Trenton, N. J., improvement in manufacturing wire rope.

Elliott Savage, Berlin, Ct., improvement in machines for threading screw-blanks.

J. L. Stevens, Kensington, England, improvement in furnaces. Patented in England, Oct. 1, 1852.

S. H. T. Tilghman, Snow Hill, Md., improvement in inhaling apparatus.

W. H. Towers, Philadelphia, Pa., for clothes-clamp.

T. W. Trussell, Winchester, Va., for improvement in dressing mill-stones.

Isaac Van Benschoten, New-York, improvement in lamps.

Milan Waterbury, Cuba, N. Y., improvement in seed-planters.

William Watt, Glasgow, North-Britain, improvement in hemp-rotting processes. Patented in England, May 22, 1852.

Mary Ann Loomis, executrix of Josh. G. Loomis, deceased, late of Philadelphia, Pa., (assignor to W. A. Gardiner, of Philadelphia,) for improvement in surgical forceps.

T. C. Ball, Shelburne Falls, Mass., (assignor to Nath'l Lamson,) for improved scythe fastening.

Harvey Snow, Dubuque, Iowa, (assignor to Jas. A. Woodbury, Winchester, Mass.,) improved presser bar for planing-machines.

Stephen Woodward, Sutton, N. H., (assignor to himself, J. P. Nelson, and A. C. Carroll,) improved apparatus for drying clothes.

Sylvanus Miller, Urbana, Ohio, improved rake harvesting-machine.

Alden Adam, Jerseyville, Illinois, improvement in hay and cotton presses.

Gottlieb Backstein, Philadelphia, improved arrangement of devices for applying power to fire-engines.

Jno. Cram, Boston, improvement in the towel-stand, or clothes-horse.

A. B. Crawford, Wooster, Ohio, improvement in clover-hullers.

Augustus Eliaers, Boston, improvement in seats for public buildings.

Fletcher Felter, Perth Amboy, improvement in feathering paddle-wheels.

C. B. Gallagher, San Francisco, improvement in converting reciprocating into rotary motion.

Elias A. Hibbard, Winchester, Va., rotary cooking stove.

Jos. Hollen, White Township, Pa., improvement in knitting-machines.

Whitten E. Kidd, New-York, improvement in moulds for pressing bonnet fronts.

Daniel B. Martin, Washington, N. J., improvement in steam-boilers.

Angus W. McDonald, New Creek Depot, Va., improvements in tanks and cisterns for supplying locomotives.

Jordan L. Mott, Mott Haven, N. Y., improvement in stoves.

James Newman, Birmingham, England, improvement in making metal rods and tubes. Dated November 28, 1854. Patented in England, March 23, 1854.

A. D. Perry, Newark, improvement in breech-loading fire-arms.

E. K. Root, Hartford, improved machine for boring chambers in the cylinders of fire-arms.

Daniel H. Shirley, of Boston, improved pianoforte action.

Nathaniel Spence, New-York, improvement in moulds for pressing bonnet frames. Dated November 28, 1854. Ante-dated Nov. 10, 1854.

Wm. Talbot, Sandford, Me., improvements in looms for weaving bags.

Wm. Tinsley, Glenn's Falls, improved mitre-box.

Edward H. Tracy, New-York, inclined sliding-valves.

George Tugnot, New-York, improved rotary lathe.

Daniel Van Fleet, Sandusky City, planing-machine.

Wm. Wakely, Homer, improvement in metal drills.

Theodore E. Weed, Williamsburgh, improvement in sewing-machines.

Wm. Wheeler, Acton, Mass., improvement in washing-machines.

Henry Richards and Charles F. Winsor, Boston, improvement in windlasses.

Osgood G. Boynton, Haverhill, assignor to Nehemiah Hunt, of same place—improvement in binding guides for sewing-machines. Dated November 28, 1854; ante-dated June 1, 1854.

Thomas J. W. Robertson, New-York, assignor to himself and Alfred E. Beach, of same place—improvement in sewing-machines.

Arad Woodworth, 3d, Boston, and Geo. Chamberlin, Olean—improvement in machinery for making rope and cordage.

Aaron H. Allen, Boston, for improvement in seats for public buildings.

Gardner S. Blodgett and Paul T. Sweet, Burlington, N. J., improved oven for baking.

P. Clark, Rahway, N. J., for improvement in steam-boiler alarms.

Horace J. Crandall, East-Boston, improved arrangements for reefing top-sails.

Joseph D. Crowell, Boston, improvement in steering apparatus.

Joshua Gray, Boston, for rotary pump.

John T. Hammitt, Philadelphia, improvement in railroad switches.

Samuel B. Kittle, Buffalo, improvement in railroad switches.

John Lilley, Birkenhead, England, improvement in machinery for separating the fibre from the woody portion of tropical plants. Patented in England, July 21, 1853.

Leonard F. Markham, Cambridgeport, improved machine for rounding the back of books.

Obadiah Marland, Boston, improvement in paper-making machines. Patented in England, September 28, 1854.

Wm. H. Miller, Brandenburgh, Ky., improvement in wash-stands.

Henry R. Miller, Louisville, improved mill for shelling and grinding corn.

Wm. H. Plumb, New-York, improved machine for crushing ores.